380Z

Mini Disc System

User Guide

for
Varitext (80/40 character)
systems

RESEARCH
MACHINES

MDS VARITEXT USER GUIDE

Copyright (c) 1982 by Research Machines Limited

All rights reserved. Copies of this publication may be made by customers exclusively for their own use, but otherwise no part of it may be reproduced, transmitted, transcribed, stored in a retrieval system, or translated into any language or computer language without the prior written permission of Research Machines Limited, Post Office Box 75, Oxford, England. OX2 0BW Tel: Oxford (0865) 49866.

The policy of Research Machines Limited is one of continuous development and improvement of its products and services, and the right is therefore reserved to revise this document or to make changes in the computer software it describes without notice. Research Machines Limited endeavour to ensure the accuracy of this document and to ensure that the products described perform correctly according to their descriptions. However, Research Machines Limited do not accept liability for the consequences of any error or omission.

Additional copies of this publication may be ordered from Research Machines Limited at the address above. Please ask for 'MDS Varitext User Guide'.

Research Machines Limited is committed to the policy of continuous improvement of its products and services. To assist the Company to improve the quality of its documentation and computer software it would like to receive reports from users on their experience with using them.

Reports referring to documentation should include:

- a description of any errors you have found;
- comments on problems you have encountered with understanding and using the manual, and suggestions for improvement;
- your name and address and a brief description of your experience with using microcomputer systems.

Queries on documentation should be sent to:

The Documentation Department,
Research Machines Limited,
PO Box 75,
Oxford.
OX2 0BW

Reports referring to software errors should include:

- a written description of each step taken and each key or command you type
- details of the hardware configuration and the version numbers of the software in use.

Queries on software errors should be sent to:

Technical Support Department,
Research Machines Limited,
PO Box 75,
Oxford.
OX2 0BW

CHAPTER 0 HOW TO USE THIS GUIDE

1. COVERAGE 0.2

2. USING THE GUIDE 0.2

3. NOTATION 0.2

4. CONTENTS 0.3

5. OTHER SOURCES OF INFORMATION 0.4

 Copyright January 1982

HOW TO USE THIS GUIDE

The aims of this guide are to enable you to:

- connect up a basic 380Z Mini Disc System
- learn how to operate it
- gain confidence in the use of your system.

1. COVERAGE

The information is presented in the form of a step-by-step guide to setting up and using a 380Z Mini Disc System. The first chapter is a general introduction and the next five chapters (see contents list opposite) deal with setting up and operating a basic Mini Disc System. These chapters are intended primarily to help first time users get started with the system.

This guide is intended for use with 380Z Mini Disc Systems purchased after 1st APRIL 1981. If your system was purchased before this date please refer to Appendix C, which identifies the major differences between the current and earlier versions of the Mini Disc System, before making use of the material in the main text.

2. USING THE GUIDE

If you are new to computing then you should **read through the left-hand pages of Chapter 1** which serve to introduce some of the basic terminology of computing. If you have some experience of computing but are new to the 380Z then the right-hand pages of Chapter 1 will serve to give you a glimpse of the basic characteristics of the 380Z Mini Disc System.

Chapters 2 to 6 are arranged as a series of two page spreads in which the left-hand (even numbered) pages specify precisely the operations to be performed and the right-hand (odd numbered) pages provide additional illustrations and explanatory text. The first time you use a chapter **read quickly through the left-hand pages** in order to get an overall idea of the operations to be performed. Then go back and **work carefully through the chapter, performing each of the operations on your system.** You will learn more about the 380Z by doing things than by reading about them. **Use the right-hand pages to help you sort out particular details** and **refer to the GLOSSARY** at the end of the guide if you have trouble understanding some of the technical terms. On subsequent occasions you can simply **use the left-hand pages as a ready reference** and you need only refer to the right-hand pages when you encounter some detailed point which you have forgotten. When using the guide as a ready reference you can use the INDEX to locate the information you need.

3. NOTATION

1. Throughout this guide, INSTRUCTIONS for you to follow are in **bold type**, so you can find them quickly when you are using the manual for reference.

2. **Messages** which you type on the keyboard are **bold underlined**, so you can see exactly what you have to type. Some keys, such as RETURN, CTRL and ESC are shown in the instructions as they appear on the keyboard to indicate that the specified key is to be pressed.

 Copyright January 1982

4. CONTENTS

CHAPTER 1: INTRODUCTION TO THE MINI DISC SYSTEM

Introduction	1.2
The Hardware	1.2
The Software	1.4

CHAPTER 2: CONNECTING UP THE 380Z

Unpacking	2.2
Setting Up	2.2
Connecting Up	2.4

CHAPTER 3: STARTING UP THE 380Z

Switching On	3.2
Inserting a Disc	3.4
Starting Up CP/M	3.6
Basic CP/M Commands	3.8
Switching Off	3.10

CHAPTER 4: COMMUNICATING WITH THE SYSTEM

Using the Keyboard	4.2
Using the Visual Display	4.6

CHAPTER 5: DISC OPERATIONS

CP/M Disc System Errors	5.2
Formatting a disc	5.4
Copying CP/M	5.6
Copying a disc	5.8

Chapter 6: FILE OPERATIONS

CP/M Commands	6.2
Transient Commands	6.10
Copying files	6.14

APPENDIX A: GLOSSARY

APPENDIX B: MDS-1 UTILITIES

APPENDIX C: EARLIER VERSIONS OF THE MINI DISC SYSTEM

APPENDIX D: AVAILABLE SOFTWARE

APPENDIX E: USE WITH TELEVISION

INDEX

 Copyright January 1982

5. OTHER SOURCES OF INFORMATION

This guide describes how to get started using a 380Z Mini Disc System. Further information is contained in the other manuals supplied with the system. These include

- **380Z Disc System Information File** - This contains detailed information about the 380Z hardware, interfaces and utilities provided with the system.

- **Firmware Reference Manual** - This describes the firmware of a number of Research Machines products, including the 40-character and Varitext versions of the 380Z, and the 480Z. It indicates which features of the firmware monitors (e.g. COS 4.0) are common and which are specific to a particular version.

****

NOTE

Until this manual becomes available Varitext systems are delivered with a COS 3.4 Reference Manual (for 40-character systems) and notes on the differences between COS 3.4 and COS 4.

****

- Manuals describing specific items of software ordered, e.g. Extended BASIC Version 5, Text Editor with Formatter.

- Manuals describing additional hardware features ordered, e.g. PIO/RTC Interface Development Board.

 Copyright January 1982

CHAPTER 1 INTRODUCTION TO THE MINI DISC SYSTEM

1. THE INTRODUCTION 1.2

2. THE HARDWARE 1.2

3. THE SOFTWARE 1.4

 Copyright January 1982

INTRODUCTION TO THE MINI DISC VARITEXT SYSTEM

1. INTRODUCTION

The purpose of this chapter is to introduce you to the terminology of microcomputers and to describe the general characteristics of the Research Machines 380Z Mini Disc Varitext Systems MDS-1 and MDS-2. A Varitext system is an enhancement of the previous 40-character system, and has a software selectable 80 character/40 character per line display; it also includes: a range of character highlighting facilities; user-definable windowing; improved scrolling; an additional user-definable 128 character set; and a variable 'beep' feature.

All computer systems consist of two elements, hardware and software. HARDWARE refers to the physical components of the system such as the keyboard or the printer, while SOFTWARE refers to the programs and data which direct the computer's operation.

2. THE HARDWARE

For a basic Mini Disc System the hardware comprises a 380Z CENTRAL PROCESSOR and one or two DISC DRIVES (housed in a single cabinet), a keyboard and a visual display (a video monitor). Additional items of hardware, such as a printer, can be added to the basic system.

The role of a central processor is to manipulate information. It is made up of two elements, a MICROPROCESSOR and a MEMORY. The computer's memory holds two types of information: programs, which direct the operation of the processor, and data (numbers and symbols), on which the programs operate. With present-day technology most of the computer's memory is VOLATILE, that is to say its contents are lost when the computer is turned off. Because of this it is necessary to have a non-volatile means of storing information. In a Mini Disc System the disc drives provide this feature.

The discs used are made of a magnetic material (mylar coated with a magnetic oxide). The disc is rotated at speed inside a cardboard cover, which serves to stiffen and protect it. Read/write heads in the disc drive come into contact with the disc surface and can read information from the disc or write information onto it in the same way that information can be read from or written to a magnetic recording tape. Information is recorded along concentric circles on the disc, called tracks, each of which is divided into a number of sectors. Each sector contains a track and sector number which serves to identify it, and a block of data. The disc is provided with a write protect notch. If this notch is covered by an opaque paper sticker then the drive mechanism is no longer able to write information onto the disc. All the information which the computer needs can be preserved on this medium - both programs and data - and once information is written onto a disc it remains there until it is erased.

You can communicate with the computer through the keyboard and the visual display. The keyboard is used to present sequences of characters to the program currently executing in the computer and, as the characters are typed, the INPUT MESSAGE is displayed on the screen. The program operates on the input message and can respond by displaying OUTPUT MESSAGES on the screen.

 Copyright January 1982

NOTES

1. The basic 380Z used with a Mini Disc System is a two-board microcomputer (the CPU and the VDU controller are on separate printed circuit boards) with 5.5K of ROM and 32K of RAM. It is run by a Z80A microprocessor which can control an encoded ASCII keyboard and a visual display (a video monitor) operating either with 24 lines of 40 characters or with 24 lines of 80 characters. The memory of the system can be expanded up to a maximum of 56K of RAM by the addition of one extra printed circuit board. The basic system includes an I/O connector which supplies and accepts TTL-level signals through a memory mapped port. It can be used to drive a Centronics-compatible printer or a variety of other devices.

2. A standard 380Z Mini Disc System incorporates a disc controller printed circuit board which can control the operation of either one or two mini-disc drives (utilising standard 5.25 inch mini-floppy discs) and which also provides a SERIAL INTERFACE port which can drive an RS232 interface at speeds from 110 baud to 9600 baud. The system uses double sided mini-floppy discs each of which can store 144K bytes of programs and data.

3. Each of the double-sided discs used with the Mini Disc System are treated as if they are TWO SEPARATE DISC DRIVES. These are labelled, for ease of reference, using the following convention (viewing the 380Z processor from the front)

   TOP (or only) drive - top surface DRIVE A
   - bottom surface DRIVE C

   BOTTOM drive - top surface DRIVE B
   - bottom surface DRIVE D

   The method of distinguishing between the top and bottom surface of a mini floppy disc is described in Chapter 3. Earlier Mini Disc Systems had their disc drives mounted vertically rather than horizontally - please refer to Appendix C for the labelling convention used with these disc drives.

4. The Research Machines 380Z Disc System uses double-sided "soft sectored" floppy discs. Each side of a disc has 40 tracks, each with 16 sectors and each sector can store 128 bytes. The first three tracks store the disc operating system and the fourth the file directory so that 72K bytes of programs and data can be stored on each surface.

5. A variety of hardware options can be added to a basic 380Z Mini Disc System - for example a high resolution graphics board.

 Copyright January 1982

3. THE SOFTWARE

The basic software provided with the Mini Disc System comprises a MONITOR PROGRAM, a disc operating system, and several utility programs.

A PROGRAM is a sequence of instructions which, when present in the computer's memory and executed, will direct the processor to perform specific actions on particular items of data. Data are characters and/or numbers manipulated by a program. Programs and data can be given names and stored in files on a disc.

There are essentially two types of software: systems software and applications software. SYSTEMS SOFTWARE is a collection of programs provided with the system by the computer manufacturer. These programs are effectively an integral part of the system. APPLICATIONS SOFTWARE is the collection of programs the user obtains, or creates, to perform specific tasks in which he is interested.

Each Mini Disc System is provided with a RESIDENT MONITOR PROGRAM (COS) which is permanently stored within the central processor and activated each time the system is turned on. The resident monitor program performs the following tasks:

- interprets and obeys simple commands from the user
- controls the operation of the standard peripheral devices (keyboard, visual display, disc drive and printer interfaces)
- provides a variety of features to support the development of machine code programs
- provides various utility functions such as memory management.

One of its most important tasks is to load into memory store from a disc the disc operating system (CP/M) which is a collection of programs whose purpose is to allow the user to use conveniently all the hardware resources provided by the computer. Once loaded into memory CP/M becomes an integral part of the complete system - when we speak of a computer system we normally mean the hardware plus the operating system programs.

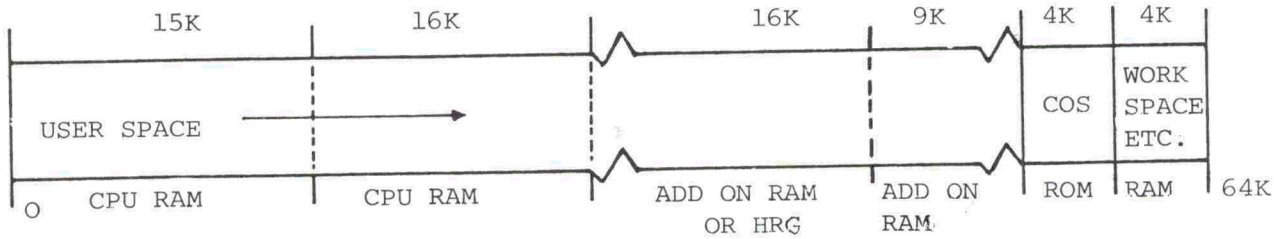
The disc operating system is made up of three modules whose purposes are:

- to communicate with the user and to interpret and obey user commands
- to communicate with the various peripheral devices attached to the system
- to manage the disc files.

The disc operating system (CP/M) is used to control the operation of any other programs which the user needs to put on the computer. Machine code programs can be loaded and run directly. Programs in other languages, for example BASIC, have to be processed by the appropriate interpreter or compiler.

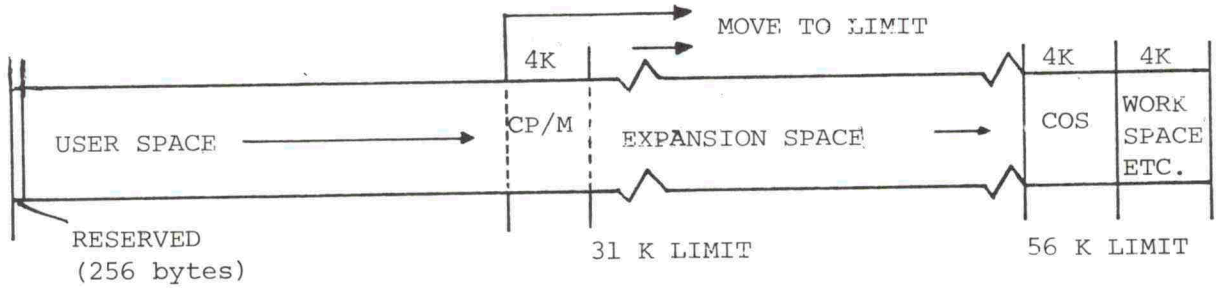
NOTES

1. The Z80A microprocessor has an address range of 64K. The way in which the standard 380Z system operating under COS uses this memory space is illustrated in the following diagram.



2. Switching on the 380Z processor automatically initiates the COS monitor program. With Mini Disc Systems the user must then load the disc operating system CP/M before entering his applications program (see Chapter 3).

3. When CP/M is in use it partitions the memory available into four zones as shown in the diagram below. CP/M can be set up to handle memory sizes from 16K to 64K, although normally 31K or 56K would be chosen.



4. The primary function of CP/M is to provide effective and convenient management of disc-based files. A FILE is a logical unit of storage on the disc which contains data or a program. CP/M's task is to implement this logical facility on the physical storage medium (mini-floppy disc).

5. The description of each file is recorded in the directory in a file allocation record which contains the symbolic name of the file (by which the user refers to it), an address allocation map (explaining where the file is stored on the disc) and various pieces of control information (for example restrictions on access to the file). Space on the disc is allocated dynamically to files until all the space available is used up.

6. Various programs are available for use with the Mini Disc System - for example Text Editor and a BASIC interpreter.

 Copyright January 1982

THIS PAGE INTENTIONALLY LEFT BLANK

 Copyright January 1982

CHAPTER 2 CONNECTING UP THE 380Z

1. UNPACKING 2.2

2. SETTING UP 2.2

3. CONNECTING UP 2.4

 Copyright January 1982

CONNECTING UP THE 380Z

This chapter explains how to connect up a basic 380Z Mini Disc system consisting of:

- a central processor equipped with either one or two disc drives
- a visual display (video monitor)
- a keyboard.

1. UNPACKING

Unpack the components and **check that you have:**

- a Research Machines 380Z central processor, equipped with either one or two disc drives, together with a mains lead fitted with a standard 3-pin plug
- a Research Machines keyboard with a length of cable attached, on the end of which is a plug.

In addition you will require:

- a video monitor and a lead for connecting the monitor to the central processor
- a mains lead for the video monitor, complete with standard 3-pin plug
- a 2-way mains adaptor or an extension lead.

2. SETTING UP

The equipment is bulky so it makes sense to select a suitable location for it before you start connecting up. Choose a work area close to a mains outlet. A sensible layout is to put the keyboard in front of the monitor and the central processor to the right, as shown in the diagram opposite.

When setting up make sure that:

- the equipment is not in direct sunlight
- the fan at the rear of the central processor is not obstructed
- the keyboard cable is not taut
- the system is in a "clean office environment" which is reasonably free from dirt and dust
- you can sit comfortably at the keyboard
- when seated at the keyboard you can see the monitor, reach the central processor and have a space on which you can rest papers.

 Copyright January 1982

NOTES

1. It is ESSENTIAL that the internal packaging inside the central processor is removed before the power is turned on. Instructions on how to remove the packing are given in a leaflet packed with the processor.

2. **Keep all the boxes and packing materials.** In event of any faults occurring with the equipment **use the original packaging to return the defective item to Research Machines.**

3. The mains lead on the monitor may have a 2-pin plug attached. If this is the case **cut the plug off and replace it with a standard 3-pin plug.**

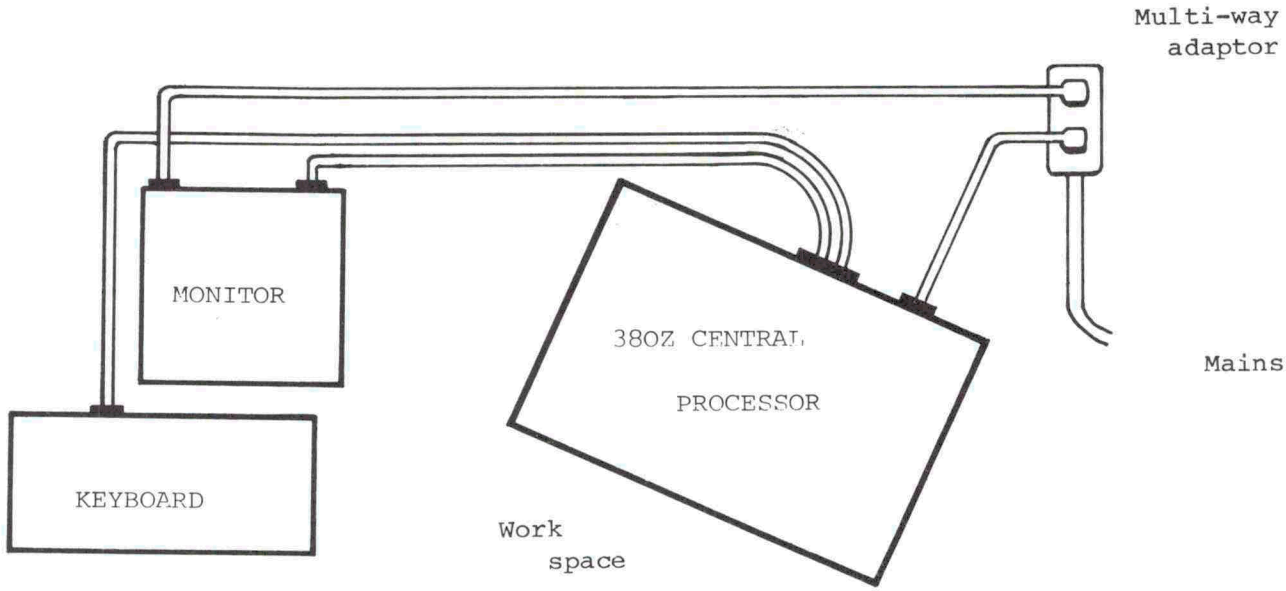
4. If any of the items that should have been provided are missing, please contact Research Machines and the omission will be rectified.

5. If all components are not connected to the same mains adaptor or extension lead the "earthline interference" may adversely affect the performance of the system.

6. If the keyboard cable is too tight this may lead to the cable being pulled out.

7. Dirt and dust on the equipment or in the atmosphere can cause damage to both discs and disc drives.

8. It is possible to use a 625-line UHF television instead of a monitor if the system is fitted with a suitable interface board. Details are given in Appendix E.



A typical layout for a basic 380Z system.

 Copyright January 1982

3. CONNECTING UP

All components of the system must be connected to the same mains adaptor or extension lead.

Before connecting up **check that the mains supply to the adaptor or extension lead is off.**

- **Plug the mains cable supplied with the central processor into the power socket at the rear of the cabinet (1) and into the extension lead or adaptor**
- **Plug the mains lead of the monitor into the extension lead or adaptor**
- **Push the plug on the keyboard lead onto the socket at the rear of the processor (2) - it will only go in one way.**

CONNECTING A MONITOR

There is a separate cable provided to connect the monitor to the central processor.

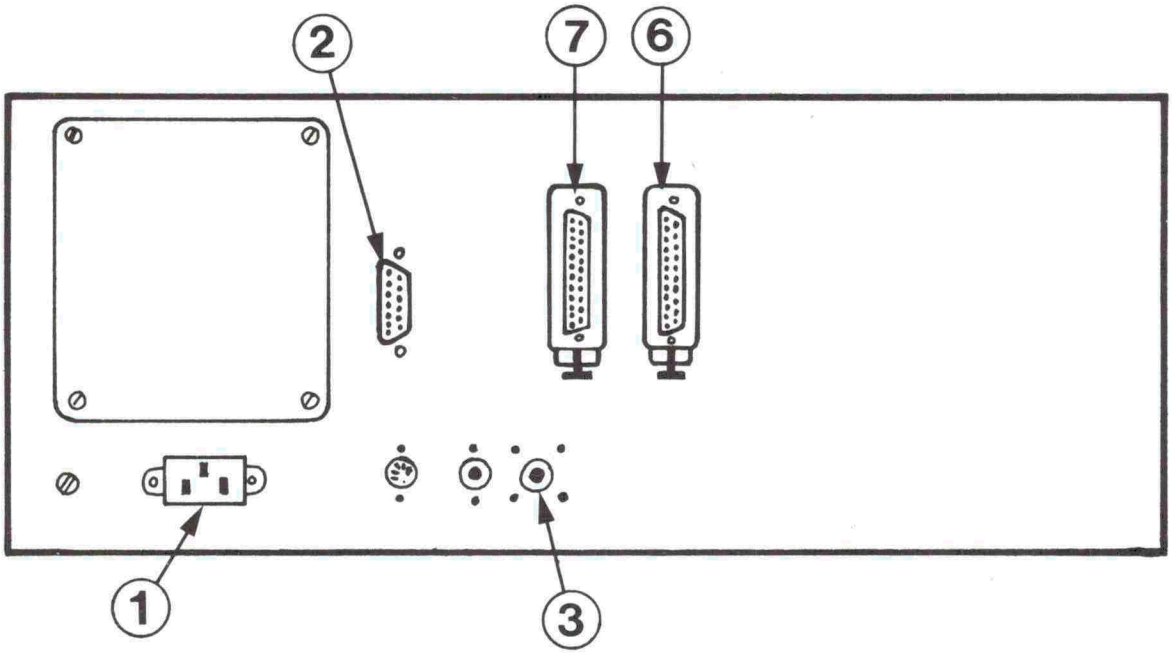
- **Screw one end of the cable to the appropriate socket at the rear of the processor (3), making sure the sleeve on the cable is fully tightened up on the screw thread**
- **Screw the other end of the cable onto the socket labelled IN at the back of the monitor (4)**
- **Set the switch at the rear of the monitor (5) to the 75Ω position.**

 Copyright January 1982

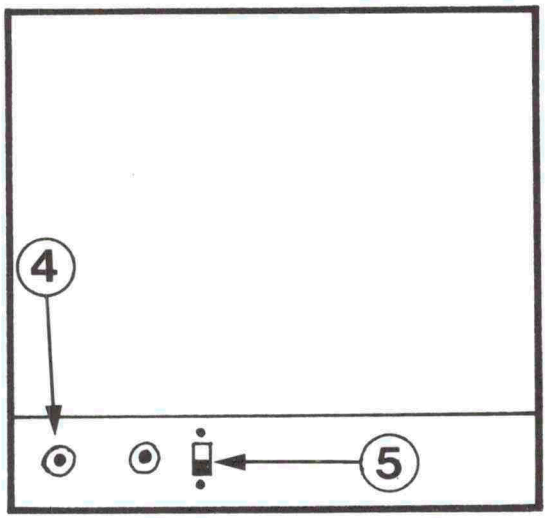
NOTES

1. The rear of your central processor may have more or fewer sockets than the one shown, this depends on the options available on your system - please refer to the Information File for information on how to identify the sockets on the rear of the processor used with earlier Mini Disc Systems. If your sockets are not already labelled correctly then we suggest you label them yourself so you can quickly identify them in future.

380Z CASE-REAR VIEW



MONITOR-REAR VIEW



KEY

1. MAINS SOCKET on PROCESSOR
2. KEYBOARD INPUT SOCKET on PROCESSOR
3. VIDEO OUTPUT SOCKET on PROCESSOR
4. VIDEO INPUT on MONITOR
5. Output control switch on MONITOR
6. SIO-4
7. User I/O

2. Whichever make and model of monitor you are using the principles for connecting it up are the same. The Hitachi 9" model VM-910 is the one shown in the diagram.

 Copyright January 1982

THIS PAGE INTENTIONALLY LEFT BLANK

 Copyright January 1982

CHAPTER 3 STARTING UP THE 380Z

1. SWITCHING ON 3.2

2. INSERTING A DISC 3.4

3. STARTING UP CP/M 3.6

4. BASIC CP/M COMMANDS

DIR 3.8
TYPE 3.8
STAT 3.10

5. SWITCHING OFF 3.10

 Copyright January 1982

STARTING UP THE 380Z

This chapter explains how to:

- turn a basic 380Z system on and off
- handle discs and disc drives
- initiate the disc operating system CP/M
- use some basic CP/M commands.

1. SWITCHING ON

If the system is not already connected up then follow the instructions given in Chapter 2, Section 3, before carrying out the instructions below.

Before turning on the MAINS SUPPLY make sure that the power switch on each piece of equipment is set to OFF.

- Plug in the mains extension lead or adaptor and switch on the mains supply
- Switch on the video monitor and allow a few seconds for it to warm up
- Insert the key into the lock on the processor and turn it clockwise to the ON position.

When the processor is turned on the reset button should light up, the fan should start and the following message, or one similar to it, should appear at the bottom left hand corner of the screen:

```
COS 4.0B/M
→ ▌
```

The message displayed on the monitor shows that switching on the processor starts up a resident control program (called COS). The symbol "→" is the COS operating system PROMPT. It is displayed whenever the 380Z is running under the control of COS and the system is waiting for a COS COMMAND.

The system starts up in 80-character mode.

- **type W**

if you intend to use software which requires 40-character mode.

 Copyright January 1982

NOTES

1. Always switch on the components of the system in the order specified.

2. The operating system, COS, is a basic monitor permanently resident in read-only memory. The monitor supports the operation of a keyboard and a visual display and can handle the loading of the disc operating system. Switching on or pressing the RESET button starts up the COS monitor. The commands available in the monitor are:

   B load disc operating system from drive A

   X load disc operating system from drive B

   J jump to address and execute program

   M enable high resolution graphics board as memory

   O select printer option.

   W switch screen width

   All COS commands may be given in the form of either upper or lower case letters. A full description of COS can be found in the FIRMWARE REFERENCE MANUAL. The only command covered in this chapter is the B COMMAND which is used to load the disc operating system CP/M.

3. The best way to restart the operation of the COS monitor system is to press the RESET button. This restores the system to the state which is entered when the system is turned on. On switching on, or pressing the RESET button, the system enters 80-character mode. If you intend to use software that requires 40-character mode

   - type W

4. The processor lock has three positions - OFF, ON and LOCK. If the key is turned to the LOCK position then the RESET button is disabled - use this setting if you want to avoid accidental restarts.

 Copyright January 1982

2. INSERTING A DISC

To use the facilities provided by the disc operating system, CP/M, you must first load the CP/M program into the computer's memory. This is because, unlike the basic control program COS, the disc operating system is not held permanently in the computer's memory but resides on a disc when not in use. Consequently, in order to load CP/M, you must know how to handle discs and disc drives. Discs need to be treated with care so read the following paragraphs carefully. The four surfaces on the discs in the two disc drives on the Mini Disc System are referred to as drives A, B, C and D (see Chapter 1). Drive A is the top surface of the top drive.

- **Before you attempt to handle a disc you should familiarise yourself with the disc drives on the processor.** Either one or two disc drives are located at the left-hand end of the processor cabinet. The doors to the disc drives are opened by pressing lightly on the TOP of the door. This releases a catch which allows the door to spring open. To close the door simply **press downwards on the front edge.**

- **Find the disc which is labelled CP/M operating system** (this is normally referred to as a system disc). **Take the disc out of its cardboard packet, BUT DO NOT attempt to take it out of its protective sleeve. Handle it carefully taking particular care not to touch the exposed parts of the disc surface.**

- **Hold the disc in your right hand with your thumb on the label, open drive A, insert the disc fully into the drive and close the door.**

There are eight ways in which a disc can be physically inserted into a drive, but only one of them is correct. The correct orientation for the disc can be found by holding the disc in your right hand with the label facing UPWARDS and the notch, which is punched out of the disc packet, on the left edge.

Never insert a disc into the drive before switching the system on.

Always remove any discs from the drives before switching the system off.

Make sure you know the normal convention for labelling disc drives. Viewing the processor from the front the drive labels are:

```
TOP (or only) drive - top surface DRIVE A
                    - bottom surface DRIVE C
BOTTOM  drive       - top surface DRIVE B
                    - bottom surface DRIVE D
```

Some other precautions to observe when handling discs are listed opposite.

NOTES

1. It is important that the disc is fully inserted into the drive. It is sensible to get into the habit of inserting the disc and then applying gentle pressure to the centre of the disc to ensure the disc is fully home before closing the door.

2. DOs AND DON'Ts with discs

   Always observe the following rules:

   - **make sure you purchase the correct discs for your system (see NOTE on page 3.12)**
   - **always replace the discs in their protective envelopes immediately they are removed from the drives**
   - **keep your discs in a box**
   - **when you handle a disc, take care not to touch the exposed parts of the disc surface**
   - **do not bend discs**
   - **keep discs free from dirt and grease**
   - **store your discs well away from magnetic fields**
   - **always CHECK that there are no discs in the drives when you switch the system on and off**
   - **make copies of your working discs and keep the originals in a safe place.**

3. Whenever information is being read from or written to a disc the red light on the disc drive door is illuminated and the drive mechanism will produce some audible clicks and whirrs.

4. Mini discs are normally provided with a WRITE ENABLE NOTCH on the left-hand edge of the disc packet. If a self-adhesive label or a piece of opaque tape is placed over this notch, then the system will refuse attempts to write files onto the disc or to erase files already on the disc. If an attempt is made to write a file onto or erase a file from a "write protected" disc then the message

   BDOS ERR on A: BAD SECTOR

   will be displayed. The method of recovering from this error condition is described in Chapters 5 and 6.

5. A system disc is any disc containing a copy of the CP/M program. However, to be really useful the system disc should also contain a number of other standard programs (see Chapter 6).

 Copyright January 1982

3. STARTING UP CP/M

Having inserted a system disc into drive A you can now load the CP/M operating system into the computer's memory. Make sure the COS prompt (Section 1) is present immediately to the left of the cursor. If it is not, then press the reset button. The complete CP/M loading procedure is

- **make sure the COS prompt is present and the correct display mode is selected**
- **load a system disc into drive A (top drive)**
- **type B**

This should result in the following message, or a similar one, being displayed on the screen:

```
RESEARCH MACHINES
31K CP/M VERS 1.4B
A>
```

This means that the disc operating system CP/M has been loaded into memory and is ready to be used. We refer to the symbols "A>" as the CP/M SYSTEM PROMPT. The ">" tells you that the system is WAITING for you to type a command. The "A" tells you that the system is currently using disc drive A (the method of labelling the disc drives is explained in Chapter 1).

YOU NEED TO LOAD THE CP/M OPERATING SYSTEM EVERY TIME YOU SWITCH ON THE PROCESSOR OR PRESS THE RESET BUTTON.

IF DRIVE A IS FAULTY and a second drive is available then CP/M can be loaded as follows

- **make sure the COS prompt is present and the correct display mode is selected**
- **load a system disc into drive B (BOTTOM DRIVE)**
- **type X**

This should result in CP/M ready message being displayed on the screen. Using the X command has the effect of reversing the labelling on the disc drives so that drive A becomes drive B (and C becomes D). This means that references to drive A will now access the top surface of the bottom disc drive and so on.

Some utility programs may access the discs directly so that, for example, reference to drive A will always access the top surface of the top disc drive. Such programs must be used with great care after an X command has been issued.

 Copyright January 1982

NOTES

1. Throughout this manual the messages which you type are **UNDERLINED**, messages which the computer generates are not.

2. The process of loading CP/M is often referred to as "booting" the disc operating system.

3. Before you load CP/M use the COS W command to select the appropriate display mode - for general use, 80 character mode is the sensible choice. Other ways of switching the display mode are explained in Chapter 4.

4. If the response to the B command is the message

   Disk Not Ready

   one of the following situations has been encountered:

   a) the disc has been inserted into the wrong disc drive - when the B command is used the system disc must always be inserted in DRIVE A;
   b) the disc has not been inserted correctly into the disc drive - go back to Section 2 and check the insertion of the disc into the drive

5. If, in response to the B command, the system reads from disc A (shown by the red light on the drive being illuminated) but produces no other response then the disc which has been inserted does not contain a copy of CP/M, or is faulty in some way. If you are attempting to load CP/M from a distribution disc when this situation occurs then you should return the disc to Research Machines for a replacement. On the other hand if you are using a copy of the distribution disc then you should try creating a new copy (see Chapter 5). To recover from this situation, press the RESET button and repeat the loading operation using a different system disc.

6. The effect of the B command is that COS reads into store track 0 sector 1 from drive A and then initiates execution of this program segment. This has the effect of loading the remainder of the CP/M operating system into store.

7. If, when you are using CP/M, you find yourself in a situation in which the computer will not respond to anything you type, or responds in a way which you cannot understand, then the simplest way to recover is to press the RESET button and load CP/M again. In some such situations all that will be necessary is to just restart CP/M itself - the method of doing this is explained in Chapter 4.

8. When in CP/M command level it is not possible to use the COS W command to switch between 40- and 80-character modes. However, the following sequence can be used:

   - **type** **CTRL F**

   enter Front Panel (ignore the output on the screen)

   - **type** **W**

   switches the screen mode, displays message giving new mode

   - **type** **K**

   return to CP/M level and continue execution.

 Copyright January 1982

4. BASIC CP/M COMMANDS

Having loaded CP/M we can now examine some of the facilities provided by the system. In this section we will explore the simplest features of three basic commands: DIR, TYPE and STAT. Other features of these commands are described in Chapter 6.

Before you try any of the commands described below, turn the system on, select 80 character mode and

- **insert a system disc in drive A**

- **load CP/M**

DIR

This command is used to display a list of the names of all the files currently stored on a disc. If in response to the CP/M prompt, A>, you

- **type DIR RETURN**

then a list of the names of all the files stored on the disc which is currently inserted in the drive named in the prompt (drive A in this case) should appear on the display. If the display has a flashing cursor in the bottom left-hand corner this means the directory extends over more than one page. To display the next page press any key.

TYPE

This command is used to display the contents of a file stored on a disc. If in response to the CP/M prompt, A>, you

- **type TYPE HELP RETURN**

then if a file named HELP is present on the disc in drive A the information shown opposite should be displayed on the screen. This is the first page of a file named HELP which contains a brief description of how to carry out some important operations using CP/M. When the screen is full of information output is suspended and a flashing cursor appears at the bottom left-hand corner of the screen. This tells you that there is more information available. If you press any key then the next page will be displayed. Subsequent pages can be displayed in the same way. After the last page has been displayed the normal CP/M system prompt appears at the bottom of the display to let you know that the system is now waiting for another command.

You can terminate the output produced by the TYPE command by pressing any key while output is being produced. This will return to CP/M and the system prompt will appear at the bottom of the screen (the control of output to the display is treated in more detail in Chapter 4).

Before using the TYPE command it is sensible to use the DIR command to check that the file you want to display is actually present on the disc you have loaded.

NOTES

1. Every disc contains a directory of file names, one for each file stored on the disc. Each file name consists of three parts as shown in the diagram below:

   The rules governing the creation of file names are specified in Chapter 6.

2. The RETURN key is used to terminate a command and to SEND it to CP/M. Nothing will happen until you press the RETURN key.

3. If you send CP/M a command which it cannot recognise it will respond with an error message. Here are some examples of errors and the responses they produce

   - type **TOPE HELP** [RETURN]
     TOPE?

   - type **TYPE HELO** [RETURN]
     HELO?

   - type **TYPEHELP** [RETURN]
     TYPEHELP?

   The standard CP/M error message is a sequence of characters terminated by a question mark and followed by the CP/M prompt. The system is waiting for you to send either the correct command or another command. Other errors which can arise when using CP/M commands are described in Chapter 6.

4. The first page of the HELP file should produce a display of the form

```
                RESEARCH MACHINES
          MINI DISC SYSTEM - CP/M HELP FILE
                    INTRODUCTION

    This file gives brief instructions on how to use some
    of the facilities provided by CP/M in order to HELP you
    use them when you need to. The index on the next page
    tells you where to find the information you
    need. Press the space bar ONCE to obtain each new
    page. When you have read the required page press the
    space bar down TWICE in VERY RAPID SUCCESSION to
    terminate output and return to CP/M, then you can carry
    out the operations specified.
```

5. The TYPE command can be used to display the contents of any file stored on a disc, but you will only be able to read the display produced by files which contain textual information.

ADJUSTING THE CONTROLS ON A MONITOR

To get the display on your monitor as clear as possible you need to adjust the brightness and contrast controls. The output produced by the first page of the HELP file is a convenient display to use to make these adjustments.

STAT

This command can be used to find out how much storage space is available on disc. If in response to the CP/M prompt, A>, you

- **type STAT RETURN**

then if a file named STAT.COM is present on the disc in drive A the following message, or one similar, should appear on the screen

A: R/W, SPACE: 40K

The "R/W" tells you that the disc space available can be either read from or written to. The size of the space is measured in terms of kilobytes (blocks of 1024, 8-bit storage locations).

Get into the habit of using the DIR and STAT commands each time you start up the system so that you know what files you have stored on the disc and how much space you have available for new files.

5. SWITCHING OFF

When you want to switch the system off you must first remove any discs that are currently inserted in the drives

- **press the top of the door of the drive to open it, take out the disc, put it back in its envelope, store it away safely and close the door of the disc drive.**

Now you are ready to switch the system off

- **switch off the monitor**
- **switch off the 380Z processor**
- **switch off the mains supply and unplug the mains extension lead or adaptor from the supply.**

It is a good idea to practice switching the system on, loading CP/M, displaying the contents of the help file and switching the system off until you are confident with the process and can follow through the correct procedure without having to refer to this chapter.

High Resolution Graphics in BASIC

Level 2

Epson Printer Support

The supplementary Manual for High Resolution Graphics Level 2 for Extended BASIC Version 5 contains references to dumping areas of the HRG screen to Anadex and Epson printers.

The supplied version of BASIC with Level 2 High Resolution Graphics (Basic 5.OH) does not contain support for the Epson Printer MX series printer. Thus users should not yet use the CALL "PRINTER" function to define the epson printer type.

Basic 5.OH will be upgraded to include Epson support in the next few months. At that time Research Machines will be offering Epson Printers.
See future issues of the newsletter for details of availability and upgrade charges.

NOTES

1. In addition to brightness and contrast controls, a monitor also has controls for adjusting the horizontal and vertical holds. If you need to use these controls they are operated in the same way as the corresponding controls on a domestic television set.

2. CP/M handles the allocation of space on the disc to the files you have created. Space allocation is dynamic - the system allocates new space for a file as you or one of your programs writes information to the file. You never have to specify a maximum size for your file. Files can go on growing until all the space on the disc is exhausted. The STAT command should always be used to check the space available before you attempt to write a large quantity of new information to a disc because recovering from an error caused by attempting to write information onto a full disc is often a tricky and time consuming operation. During this operation there is always a risk of losing some of the information which you were attempting to file.

3. DIR and TYPE are examples of CP/M commands which can be used whenever CP/M is loaded. STAT is an example of a CP/M transient command, it can only be used when there is a disc on the system which contains the file STAT.COM.

4. The CP/M command interpreter treats all small letters as if they were the corresponding capital letters. This means that all CP/M commands can be expressed in either upper or lower case or a mixture of the two. It also means that only capital letters and digits (and one or two special symbols - see Chapter 4) can be used to specify files names.

5. All CP/M commands can be used in either 40-character or 80-character mode.

6. Failure to remove the discs from the drives before switching the system off or inserting the discs into the drives before switching on may lead to the discs being damaged and some of the information on them being destroyed.

 Copyright January 1982

PURCHASING DISCS

When purchasing mini-floppy discs please note:

1. The Mini Disc System uses 5.25" soft sectored, single- or double-sided, 40 track, mini-floppy discs. Make sure the disc you purchase for use with your system are 40 tracked. The use of 35 tracked mini-floppy discs with a Mini Disc System is likely to result in damage to the disc drives.

2. It is ABSOLUTELY ESSENTIAL that you only purchase mini-floppy discs from one of the manufacturers CURRENTLY RECOMMENDED by Research Machines Limited. In our experience only a few manufacturers have so far demonstrated the ability to manufacture mini-floppy discs which are satisfactory for use in the double-sided drives used with our Mini Disc System. If you use a disc of inferior quality then you run the risk of some of the oxide coating on the disc transferring itself onto the read/write heads in the disc drive. If this happens the heads will be seriously damaged and will have to be returned to our factory for repairs.

3. RESEARCH MACHINES LIMITED WARRANTY FOR THE MINI DISC SYSTEMS DOES NOT COVER DAMAGE TO DISC DRIVES CAUSED BY THE USE OF POOR QUALITY MINI-FLOPPY DISCS.

4. The list of recommended manufacturers as of January 1981 is

   Maxell, IBM, Dysan.

   This list is reviewed annually and some manufacturers may leave the list and others may join it.

 Copyright January 1982

CHAPTER 4 COMMUNICATING WITH THE SYSTEM

1. USING THE KEYBOARD 4.2
   - CAPS LOCK and SHIFT 4.2
   - SPACE BAR and DELT 4.4
   - REPT 4.4
   - ESC 4.4
   - LINE FEED 4.4
   - RETURN 4.4
   - CTRL 4.6

2. USING THE VISUAL DISPLAY 4.6

 Copyright January 1982

COMMUNICATING WITH THE SYSTEM

This chapter explains how to

- use the keyboard
- use the visual display.

The keyboard and visual display (video monitor) together provide the basis for communicating with the system. In order to get the best out of your system you must be familiar with the use of the facilities provided by these devices.

Before starting to work through any of the sections in this chapter make sure you are completely familiar with the procedures for switching your system on and off and loading the CP/M operating system (see Chapter 3).

1. USING THE KEYBOARD

The keyboard provided with your Mini Disc System is similar to a normal typewriter keyboard both in the range of characters provided and in its layout. However, it has some extra CONTROL KEYS which have special functions - these are the keys which are shaded in the diagram opposite. The purpose of this section is to help you find your way around the keyboard by explaining some of the facilities provided by means of these control keys.

CAPS LOCK and SHIFT

The keyboard can operate in one of two modes

- NORMAL MODE - in this mode a letter key alone produces a small letter; a digit or symbol key alone, the digit or symbol on the bottom of the key; a letter key with the SHIFT key, a capital letter; and a digit or symbol key with the SHIFT key, the symbol on the top of the key.
- UPPER CASE MODE - in this mode a letter key, either alone or with the SHIFT key, produces a capital letter; a digit or symbol key alone, the digit or symbol on the bottom of the key; and a digit or symbol key with the SHIFT key, the symbol on the top of the key.

The CAPS LOCK key controls the transfer between these two modes of operation. This key has no other function.

If the keyboard is operating in normal mode and you depress the CAPS LOCK key, then the keyboard is switched to operating in upper case mode. If the keyboard is operating in upper case mode and you press the CAPS LOCK key then the keyboard is switched to operating in normal mode.

To type the symbol at the top of a digit or symbol key it is necessary to hold down the SHIFT key while you depress the appropriate key. If you are operating in normal mode you must also hold down the SHIFT key when you want to type a capital letter.

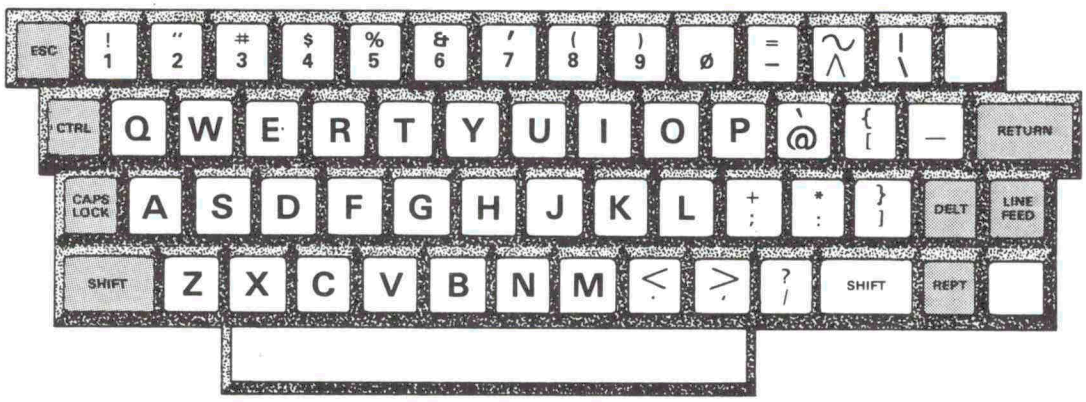
NOTES

1. You can always determine the mode of operation of the keyboard by depressing any letter key alone. If this results in a small letter then the keyboard is in normal mode otherwise it is in upper case mode.

2. When a letter, a digit, or a symbol key is depressed it results in the cursor on the display being replaced by the symbol generated and the cursor being moved one place to the right (see Section 2). However, the CP/M command interpreter treats any small letter as if it were the corresponding capital letter, even though the small letter is displayed on the screen.

3. The description given in this section of the features of the keyboard apply to the standard keyboard provided with the Mini Disc System. The keyboards provided with earlier 380Z systems had some different features; for example the DELT control key operated only when the SHIFT key was held down (see Appendix B).

The Keyboard



CONTROL KEYS

ESC	CAPS LOCK	SHIFT	DELT	RETURN
CTRL	SHIFT	SPACE BAR	REPT	LINE FEED

SPACE BAR and DELT

These keys allow you to alter the position of the cursor on the screen. Depressing the SPACE BAR generates a blank character, which has the effect of moving the cursor one position to the right, unless the cursor is already at the right-hand end of a line in which case it advances the cursor to the left-hand end of the next line.

Depressing the DELT key moves the cursor one position to the left deleting the character to the left of the cursor, except when the cursor is already at the left-hand end of a line, in which case it has no effect on the display.

REPT

All the time the REPT key is depressed it will generate copies of the last character typed. For example, typing A and then holding down the REPT (or typing A while holding down the REPT key) will produce a string of letter As.

ESC

This key performs no useful function under CP/M. When it is depressed it results in the symbols ↑ [being displayed on the screen.

LINE FEED

Depressing this key has the effect of moving the cursor vertically down the screen to the line below. This key should not be used when typing CP/M commands.

RETURN

You have already learnt (Chapter 3 Section 4) that depressing the RETURN key has the effect of sending the message you have typed to CP/M. Until you press RETURN nothing at all will happen, unless the line you type is over 127 characters when CP/M automatically inserts a RETURN for you.

You need to type RETURN at the end of most CP/M commands, so if you think something should have happened and it hasn't then press RETURN in case you have forgotten to do so!

Whenever CP/M is loaded and the system prompt is present then each time you press the RETURN key a message is sent to CP/M. If CP/M is unable to interpret what has been typed as one of its commands then it responds with the standard CP/M error message (see Chapter 3 Section 4).

NOTES

1. Whenever CP/M is loaded you can experiment with the effect of pressing letter keys, digit keys, and the control keys CAPS LOCK, SHIFT, SPACE BAR, LINE FEED, DELT and REPT, because no response will be generated by the system until you send the message you have typed by pressing the RETURN key - and even then all that is likely to happen is that you will generate the standard CP/M error message and a new prompt (see Chapter 3 Section 4).

2. Either the system prompt, if it is present, or the left-hand edge of the screen serves to mark the left-hand end of a line.

3. The meaning of the control keys may be altered by the program that you are using. For example the ESC key is used to terminate messages when using the standard Research Machines Limited Text Editor program, (TXED).

CTRL

Holding down the CTRL key while pressing a letter key provides access to a whole range of primitive commands some of which are described elsewhere in this manual. To illustrate the effect of the CTRL key we will describe a primitive command which can be used to delete a complete line. If in response to the CP/M prompt you have typed

TYPR MYFILE.TEX

and you notice the spelling error before you depress the RETURN key then instead of repeatedly using DELT you can hold down CTRL and depress the U key. This will transfer the cursor to the left-hand end of the next line, signal that the line you have just typed has been deleted and wait for you to retype the command.

When a control character is typed a control code is generated (see note 4) the meaning assigned to this code is determined by the program which receives it (see note 2). Before you use a new program **check through its documentation to find out which control characters affect the operation of the program and how they are used.**

2. USING THE VISUAL DISPLAY

The visual display (video monitor) serves two purposes:

- to provide a visible representation of what the user has typed on the keyboard

- to provide a visible representation of messages created by the program which is currently being executed.

A variety of facilities have been provided to control the operation of the visual display, but many of these are normally only available under program control. In this chapter we are only concerned with those control facilities which are normally accessed directly from the keyboard.

The display itself can be presented in two forms, either as 24 rows of 40 characters or as 24 rows of 80 characters. Each character position can display one of 256 characters normally covering the ASCII and viewdata/teletext character sets. Using a feature built into COS (see Firmware Reference Manual) the user can, if he wishes, redefine some or all of the teletext (low resolution graphics) characters to suit his own applications.

Only the ASCII character set is available directly from the keyboard. The character displayed when a key is pressed nearly always corresponds to the character inscribed on the key. The display cursor normally indicates the point on the display where the next input character will appear. As each character is displayed the cursor moves one position to the right unless it is at the right-hand end of a line in which case it moves to the start of the next line. As input is typed it is "scrolled" up the screen so that the line being typed is normally at the bottom of the screen.

NOTES

1. You can achieve the same effect as CTRL U by typing DELT REPT. To emphasize the fact that the control key CTRL must be held down while typing the appropriate letter, sequences like CTRL and U will be shown as CTRL U.

2. The meaning of a control character, that is a key which is depressed while the control key is held down, depends on the circumstances in which it is used. For example CTRL C typed before CP/M has been loaded leads to COS being restarted, but CTRL C typed after CP/M has been loaded leads to CP/M being restarted.

3. The display is driven by 2K bytes of static RAM. Since the visual display contains up to 1920 (24 x 80) character positions and each character position corresponds to a unique address in this static RAM, there is 1 byte of memory for each character position which provides 256 possible characters. The 128 possible ASCII characters need 7 bits to define them so the eighth bit is used to distinguish between ASCII and teletext characters. In teletext mode each character position can be thought of as being divided into six small rectangles (2 wide and 3 deep) so that 64 different graphics characters can be constructed by shading in different combinations of rectangles. The 64 graphics characters require six bits to specify them so the seventh bit is used to specify the intensity of the character. When the display is operating in 80 character mode it is possible to switch this feature off and to have all graphics characters bright (see Firmware Reference Manual). The output displayed by each element in the full character set is shown in a table in the 380Z Disc System Information File.

4. The ASCII characters with codes 0 to 31 (decimal) are control characters. By convention Research Machines and most other people refer to these characters as CTRL@ (code 0), CTRL A (code 1), CTRL B (code 2),...., and so on (where the labels are chosen according to the sequence defined in column 3 of the table) rather than by their standard mnemonic names. Control codes, when sent to an output device (visual display, printer,...) normally result in some special action and will not be printed or displayed. Different devices will interpret the same code in different ways. Control codes also allow the user to send commands to a program. Different programs will interpret the same codes in different ways (see note 2).

 Copyright January 1982

When displaying output from an executing program the display normally operates in page mode, which means that when a complete page (23 lines) has been sent to the display scrolling of output is suspended to give the user time to read it. The end of a page is marked by a flashing cursor in the bottom left-hand corner of the display. Depressing any key when the cursor is flashing at the bottom of a page will allow scrolling to continue so that a further page of output can be displayed.

The paging of output can be controlled from the keyboard by using the control character CTRL A.

If the display is operating in page mode (this is the mode which is selected when the system is turned on) then **typing CTRL A** suspends paging of output which means that scrolling will continue until output is completed or until paging is restored.

If the display is operating in unpaged mode (as a result of suspending paging through the use of CTRL A) then **typing CTRL A** reactivates paging of output (if the keyboard is active) at the end of the current line.

CTRL A can also be used to suspend output. If you type CTRL A during scrolling of output then scrolling is suspended unless you were in page mode, in which case scrolling continues at full speed until you type CTRL A again. You can resume output either by pressing CTRL A or by pressing any other key.

Pressing any key during the scrolling of output from a CP/M command terminates output and returns control to CP/M. It is best to get into the habit of using a specific key for this purpose, for example SPACE BAR. Pressing any key at the end of a page simply leads to the next page being displayed.

Each item of software may control paging and termination of output in a slightly different way. For example while the Research Machines BASIC interpreter uses CTRL A to turn page mode on and off, it requires the use of CTRL Z to terminate output. Before you use an item of software find out how it controls the paging of output.

When the system is operating in 80-character mode it is possible to put the display into a mode called smooth scrolling, which means that scrolling is slower than normal and much less jerky. This mode is entered by typing

CTRL @

The system continues in smooth scrolling mode until either **CTRL @** is pressed or the system is switched to 40-character mode. Smooth scrolling is NOT available in 40-character mode.

The system also provides facilities to enable a program to

- turn the paging of output on and off
- turn smooth scrolling on and off
- switch between 40 and 80 character modes
- switch between scrolling up and scrolling down
- scroll output to any rectangular part of the display independently of the rest of the display

A specification of these features is given in the Firmware Reference Manual.

 Copyright January 1982

NOTES

1. The CP/M command interpreter treats any small letter as if it were the corresponding capital letter even though the small letter is displayed on the screen.

2. When output from a CP/M command to the display is terminated by the user pressing any key while scrolling is in progress the program producing the output is terminated and control returns to CP/M, which means that any further output which the program would have produced is lost.

3. The control of paging when the system is executing a CP/M command is summarized in the table below:

Mode	State	Effect of CTRL A	Effect of any key
Paged	CP/M prompt	Switch to unpaged mode	------
	Scrolling output	Switch to unpaged mode and continue scrolling output	Terminate output
	End of page	Switch to unpaged mode and start scrolling output	Scroll next page
Unpaged	CP/M prompt	Switch to paged mode	-----
	Scrolling output	Switch to paged mode and stop scrolling output	Terminate output

 Copyright January 1982

THIS PAGE INTENTIONALLY LEFT BLANK

 Copyright January 1982

CHAPTER 5 OPERATIONS ON DISCS

1. CP/M DISC SYSTEM ERRORS 5.2

2. FORMATTING A DISC 5.4

3. COPYING CP/M 5.6

4. COPYING A COMPLETE DISC 5.8

 Copyright January 1982

OPERATIONS ON DISCS

All the programs and data which you use with CP/M, including the CP/M programs themselves, must be stored in files on a disc. One of the most important operations involved in using CP/M is copying information from one disc to another in order to ensure that

- you have the right information available when you need it
- you have copies of all your important files on two separate discs so that if one disc is damaged you can use the other.

This chapter deals with copying complete discs and the next one covers the copying of individual files. It is ESSENTIAL to master the material in this chapter in order to be able to make copies of your software issue discs. You only receive one copy of a software issue disc so you should make a copy of it BEFORE you use the software. **Never use the software issue disc for day-to-day operations.**

BEFORE starting to work through this chapter make sure you are familiar with the procedures for switching your system on and off and loading the CP/M operating system (see Chapter 3).

The importance of keeping backup copies of all useful discs cannot be emphasized too strongly. It is only too easy to make a mistake and lose a lot of useful information. Better to spend a few minutes making a copy than have to spend several hours retyping the contents of lost files.

1. CP/M DISC SYSTEM ERRORS

When accessing information on a disc there are three types of error that can arise - identified by CP/M error messages. These messages are:

BDOS ERR ON E: SELECT

which occurs if you attempt to access a disc drive which does not exist,

BDOS ERR ON B: R/O

which occurs if you attempt to write onto a disc which CP/M has designated as READ ONLY, and

BDOS ERR ON A: BAD SECTOR

which occurs if the system is unable to make the transfer requested.

The accompanying notes explain how to interpret the different types of BAD SECTOR error. The way in which you recover from one of these errors often depends on what you are doing at the time when the error occurred and is described along with the situations in which they arise.

 Copyright January 1982

NOTES

1. The Mini Disc System uses "soft-sectored" mini-floppy discs. The storage on the discs is organized into a number of concentric tracks, each of which is divided into a number of sectors. A sector consists of a header block containing the track and sector number, which is recorded on the disc when it is formatted, followed by a data block of 128 bytes. The discs used have 40 tracks and 16 sectors on each surface. The first three tracks are reserved for the CP/M system (even if it is not present) and the fourth track for the disc directory, leaving 72K bytes available for the storage of files.

2. CP/M 1.4 allows up to four discs to be on line, referred to as discs A, B, C and D. The Research Machines' convention for labelling disc drives is explained in Chapter 1.

3. The disc drives on the Mini Disc System allow discs to be physically protected against accidental writing by means of a "write permit notch" in the bottom edge of the disc. If a notch is not present or is covered by a piece of opaque sticky paper then the files on the disc can be read, but no new files can be written and no existing files can be changed, erased or renamed. Any attempt to write onto a "write protected" disc will lead to a CP/M disc error message.

4. Whenever you change the disc in a disc drive the CP/M system declares this disc to be read only so as to avoid inadvertently overwriting information on the newly inserted disc (because the computer currently holds in memory a picture of the original disc). To overcome this problem **you must restart CP/M, using the CTRL C command, BEFORE attempting to WRITE to a newly inserted disc.** Restarting CP/M causes the system to read into memory the allocation vectors of the currently inserted discs and "authorises" CP/M to write on any disc which is NOT physically write protected.

5. When a disc error is displayed the left most character in the error message immediately above the letters BDOS specifies the type of error. These characters are interpreted as follows:

   O - OFFLINE: occurs when there is no disc in the drive or when a disc is not properly inserted in a drive or when trying to access side C or D of a single-sided disc.
   P - PROTECTED: occurs when attempting to WRITE to a disc which has been write protected or when attempting to read a file of length greater than 1 extent (see Section 3) from a disc which has been write protected.
   A - ADDRESS ERROR: occurs when attempting to read or write to an unformatted disc or when using a dirty, damaged or worn disc.
   C - CHECK SUM ERROR: occurs when using a dirty, damaged or worn disc.
   D - DATA ERROR: normally indicates a hardware malfunction but can occur when using a badly formatted disc.
   V - VERIFY ERROR: indicates a hardware malfunction.

   When reporting persistent disc errors to Research Machines please specify the operation being attempted and the disc error code which was displayed.

 Copyright January 1982

2. FORMATTING A DISC

Any discs used with the Mini Disc System must be correctly formatted. New discs must be formatted using the CP/M utility program FORMAT before they are used. To format a disc proceed as follows:

- **turn on the system, insert a system disc in DRIVE A and load CP/M**

  the normal CP/M prompt will appear

- **type FORMAT RETURN**

  the message

  ```
  FORMAT/M V 4.0B

  WARNING-destroys all programs
  Remove system disk!
  Format which disk (A,B,C,D):
  ```

  will appear

- **REMOVE the CP/M system disc** (this ensures you won't format it by mistake!)

- **type A**

  the message

  ```
  Insert disk in A, then type RETURN:
  ```

  will appear

- **insert the new disc to be formatted in DRIVE A**

- **Type RETURN**

  the FORMAT program is run, the front side of the disc in drive A is formatted and the message

  ```
  Format complete, no errors
  Format which disc (A,B,C,D):
  ```

  will appear

- **type C RETURN**

  the FORMAT program is run, the other side of the disc in drive A is formatted (drive C) and the message above repeated

- **REMOVE the formatted disc** and

EITHER

- **repeat the previous five steps to format another disc**

OR

- **type CTRL C**

  which terminates execution of FORMAT and returns control to CP/M with the message

  ```
  Replace system disc
  ```

- **replace the system disc**

 Copyright January 1982

NOTES

1. The FORMAT program must be used with great care because if it is run on a used disc it totally erases all the files on it, including the CP/M operating system.

2. Make sure you understand the labelling of the disc drives (see Chapters 1 and 3) before you use the FORMAT program.

3. If in reply to the prompt

   Format which disc (A,B,C,D):

   you type a letter corresponding to a drive with no disc in it then the error message

   Disk not ready

   will appear

4. If in reply to the prompt

   Format which disc (A,B,C,D):

   you type any character other than A, B, C or D then the error message

   Invalid disk, try again

   will appear.

5. If you are unsure whether a disc has been formatted you can check as follows

   - **put a system disc in DRIVE A and load CP/M**
   - **replace the system disc in DRIVE A with the disc you want to check**
   - **type DIR RETURN**

   If the system either displays the directory or the message

   NOT FOUND

   the disc has been formatted. If the response is the message

   A
   BDOS ERR ON A: BAD SECTOR

   then the disc is unformatted. Return the system disc and

   - **type CTRL C**

   to restart CP/M.

6. If the FORMAT program encounters disc read or write errors then it will produce a sequence of error reports and terminate with a message like

   Format complete, 05 errors

   meaning that a total of 5 errors has been encountered during formatting. The best thing to do in this case is to format the disc again. If it is a new disc and the errors persist then return it for checking.

7. Executing the FORMAT program leaves the system in unpaged mode (see Chapter 3). To restore the system to page mode
   - **type CTRL A**

 Copyright January 1982

3. COPYING CP/M

It is common practice to have a copy of the CP/M operating system on each of the discs you are using because this enables you to start or re-start your system using any of your discs. Two utility programs MOVCPM and SYSGEN are used to put a copy of CP/M onto a disc. To put the CP/M programs onto a disc proceed as follows:

- **turn on the system, insert a system disc in DRIVE A, insert the disc onto which CP/M is to be copied into DRIVE B and load CP/M**

  the normal CP/M prompt will appear

- **type MOVCPM * * RETURN**

  MOVCPM will be run and the message

  ```
  CONSTRUCTING 56K CP/M VERS 1.4
  READY FOR "SYSGEN" OR
  "SAVE 32 CPM56.COM"
  A>
  ```

  or one similar to it will appear

- **type SYSGEN RETURN**

  the message

  ```
  SYSGEN VER 1.4
  SOURCE DRIVE (OR RETURN TO SKIP)
  ```

  will appear

- **type RETURN**

  the message

  ```
  DESTINATION DRIVE (RETURN TO REBOOT)
  ```

  will appear.

- **type B**

  the message

  ```
  DESTINATION ON B, THEN TYPE RETURN
  ```

  will appear; make sure the CORRECT destination drive is specified

- **type RETURN**

  the message

  ```
  FUNCTION COMPLETE
  DESTINATION DRIVE (RETURN TO REBOOT)
  ```

  will appear

- **REMOVE the disc from DRIVE B** and

EITHER

- **insert another disc into DRIVE B and repeat the previous 3 steps to copy CP/M onto this disc**

OR

- **type RETURN**

which terminates execution of SYSGEN and returns control to CP/M.

NOTES

1. Great care must be taken when using the utility programs MOVCPM and SYSGEN as failure to type the correct arguments will often not produce an error message but will probably cause either no copy of CP/M or an invalid copy of CP/M to be sent to DRIVE B.

2. The purpose of the MOVCPM program is to create a version of CP/M to match a given memory requirement. If you are ABSOLUTELY CERTAIN that the version of CP/M on the system disc which you are copying matches the memory size of the computer you are using then you need not use MOVCPM, you can copy the system directly using SYSGEN alone.

3. The arguments of MOVCPM must be typed with care - **make sure there is a SPACE between MOVCPM and the first asterisk (*) and a SPACE between the first and second asterisks.** If the second asterisk is omitted then MOVCPM will terminate and return control to CP/M without leaving a new version of CP/M ready for SYSGEN to copy onto a disc. If either a message like

   CONSTRUCTING 56K CP/M VERS 1.4B
   56K CP/M VERS 1.4B

   or the message

   INVALID MEMORY SIZE

   or the standard CP/M error message appears then you have typed the wrong arguments. You can correct this situation by typing the complete MOVCPM command again.

4. If there is no copy of the MOVCPM program on the system disc which you have loaded then when you

   - type **MOVCPM * *** **RETURN**

   the response will be the standard CP/M error message. Replace the system disc by one which contains MOVCPM. You can always check for the presence of MOVCPM by using the DIR command. After loading CP/M

   - type **DIR MOVCPM.COM** **RETURN**

   The message

   NOT FOUND

   will appear if the file MOVCPM.COM is not on the disc.

5. When SYSGEN is used in conjunction with MOVCPM it is ESSENTIAL to type RETURN in response to the first SYSGEN prompt

   SYSGEN VER 1.4
   SOURCE DRIVE (OR RETURN TO SKIP)

   otherwise SYSGEN will copy CP/M from the drive you specify and the version of CP/M created by MOVCPM will be ignored. When you use SYSGEN WITHOUT MOVCPM the correct response to the first SYSGEN prompt is

   - type **A**

   The message

   SOURCE ON A, THEN TYPE RETURN

   will appear. Make sure the correct source drive is specified
   - type **RETURN**
   then continue as described on the opposite page.

 Copyright January 1982

4. COPYING A COMPLETE DISC

Discs do not last forever so a backup copy should be made of all important discs, for example your software issue discs. To make a backup copy of all the files on the disc you use the utility program PIP which is a general purpose file copying program. To make a backup copy of all the files on a disc proceed as follows:

- **turn on the system, insert a system disc in DRIVE A and the disc on which the copy is to be made in DRIVE B** (if this is a new disc make sure it is properly formatted) **and load CP/M**

  the normal CP/M prompt will appear

- **type PIP RETURN**

  the PIP program is loaded and the PIP prompt, a "*" symbol, will appear

- **replace the system disc by the disc to be copied**

- **type B:=A:*.* RETURN**

  PIP creates a complete copy of the files on the disc in DRIVE A on the new disc in DRIVE B (keeping the file names unchanged) and the copy operation terminates with the PIP prompt.

- **type CTRL C or RETURN after replacing your system disc in A:** to return control to CP/M.

If you are copying files onto a used disc and PIP encounters a file on disc A which already exists on disc B it will copy the file from disc A to disc B in the usual way and then DELETE the original file with that name on disc B. If CP/M and PIP are both on the disc which you are copying then this disc can also be used as the "system disc" referred to in the instructions and the procedure is carried out as described but omitting the third step. When using the procedure described above remember that all the files on the disc in drive A will be copied - and only files. The CP/M operating system is not a file - it is a machine code program stored on three reserved tracks on the disc. IT CAN ONLY BE COPIED ONTO A DISC BY USING THE SYSGEN COMMAND.

The CP/M system is not listed by the DIR command so if you are not sure whether CP/M has been copied onto a disc the only way to check is to

- **press RESET**

  the normal COS prompt will appear

- **put the disc you want to check in DRIVE A**

- **type B**

If the CP/M start up message and prompt appear then CP/M is present on the disc. Some further operations on complete discs, for example erasing all the files or determining the space used by all the files, are described in the following chapter.

 Copyright January 1982

NOTES

1. Before copying a disc check that it contains the files you want to copy by using the DIR command. Using the program PIP in the manner described opposite will copy all the files listed by the DIR command. Selective copying of files from one disc to another is explained in the next section.

2. If the disc onto which you are copying the files already contains some files then use the STAT command both to find out the size of the files you are copying and to determine whether the disc on to which you are copying them has enough space left.

3. If the disc to be copied is either not inserted in the drive or is not inserted properly then when PIP is run the message

   BDOS ERR ON A: BAD SECTOR

   will appear. Put back the system disc

   - type CTRL C

   to reload CP/M and restart the copying operation from the beginning.

4. If the program PIP is not present on the system disc then the response will be the standard CP/M error message.

5. The PIP argument B:=A:*.* must be typed carefully because failure to present PIP with the correct argument can lead to just some (possibly none) of the files being copied. Serious errors in the argument, for example

   - type B:=A:*>* **RETURN**

   will lead to a message like

   INVALID FORMAT: A:*>

   and the argument will be rejected and the PIP prompt will be repeated.

6. If the system disc is not replaced in DRIVE A, then when you type RETURN one of two things can happen

   - if no disc is in drive A then the message
     ?BOOT?

   will appear followed by the COS prompt. Insert a system disc in DRIVE A and load CP/M in the normal way

   - if there is a disc in drive A which either does not have CP/M on it or has a version of CP/M different from the one on the system disc then the system will often enter the Front Panel (a COS feature designed to aid machine code programming).

   This condition can be identified by the message

   BREAK
   !

   at the bottom of the screen. To recover, insert a system disc in DRIVE A

   - press RESET

   and then load CP/M in the normal way.

 Copyright January 1982

THIS PAGE INTENTIONALLY LEFT BLANK

 Copyright January 1982

CHAPTER 6 OPERATIONS ON FILES

1. CP/M COMMANDS 6.2
Examining Disc Directories (DIR) 6.4
File Names 6.4
File Name Matches 6.4
Renaming a File (REN) 6.8

2. TRANSIENT COMMANDS 6.10

3. COPYING FILES 6.14
Copying a Group of Files 6.18
Creating a System Disc 6.20

 Copyright January 1982

OPERATIONS ON FILES

All the programs and data which you use with CP/M must be stored in files on a disc. This chapter describes the CP/M commands which are available to help you manage your disc files in order to ensure

- you can have the right information available when you need it

- you can create back-up copies of all your important files.

Before starting to work through this chapter make sure you are familiar with the procedures for switching your system on and off and loading the CP/M operating system (see Chapter 3).

The importance of keeping back-up copies of all your useful files cannot be emphasized too strongly. It is only too easy to make a mistake and lose a lot of useful information. Better to take a few minutes copying a file than to spend several hours recreating it.

1. CP/M COMMANDS

The basic form of three CP/M commands, DIR (display the disc directory), TYPE (display contents of a file) and STAT (display the disc status) was explained in Chapter 3. Make sure you are familiar with this basic material before you go on to the material below.

LOGGING ON TO A DISC DRIVE

When CP/M is loaded (see Chapter 3) CP/M is "LOGGED ONTO" drive A by which we mean that

- each time CP/M issues a prompt it is in the form A>

- the "CURRENT DRIVE" when a CP/M command is issued is drive A,

so for example if you

- **type DIR RETURN**

then CP/M will display the directory of the disc currently loaded in drive A.

The drive named in the CP/M prompt is the one the system is logged onto and is to be referred to as the current drive. To change the current drive

- **type d: RETURN**

where the argument d must be replaced by a disc drive name (one of the letters A to D). For example, if CP/M is logged onto drive A and you

- **type B: RETURN**

the result is a CP/M prompt in the form B> and CP/M is logged onto drive B. The system remains logged onto the drive selected until you issue another command to change the current drive.

NOTES

1. The normal drive labelling convention used by Research Machines is explained in Chapter 1, but remember that this labelling is reversed (A becomes B and C becomes D) when CP/M is loaded using the COS X command.

2. If you try to log onto either an empty disc drive or a drive in which the disc has not been properly inserted then a message like

   BDOS ERR ON B: BAD SECTOR

   will appear. To recover

   - type CTRL C

   to restart CP/M.

3. If you type in the place of the drive name any character other than A, B, C, or D then an error message like

   BDOS ERR ON E: SELECT

   will appear. There is no easy way to recover from this under CP/M 1.4. PRESS RESET and try again.

   - press CTRL C

4. If you omit the colon (:) after the drive name then the standard CP/M error message will be produced (see Chapter 4) - retype the command correctly.

 Copyright January 1982

EXAMINING DISC DIRECTORIES (DIR)

Disc directories can be examined using the DIR command. Whenever the CP/M prompt is present, to display the directory of the disc loaded in the current drive (the one named in the prompt)

- **type DIR RETURN**

To display the directory on a disc in any other drive

- **type DIR d: RETURN**

where the argument d must be replaced by a disc drive name (one of the letters A to D), for example

A>DIR C: RETURN

displays the directory of the disc loaded into drive C.

FILE NAMES

Every file stored on a disc is identified by a file name. When a file name is used as an argument in a CP/M command it must normally be given in full in the form

d:name.ext

The rules governing the formation of the components of the name are given in note 1 opposite. In some situations the drive name can be omitted, in which case the file will usually be assumed to be on the current drive.

FILE NAME MATCHES

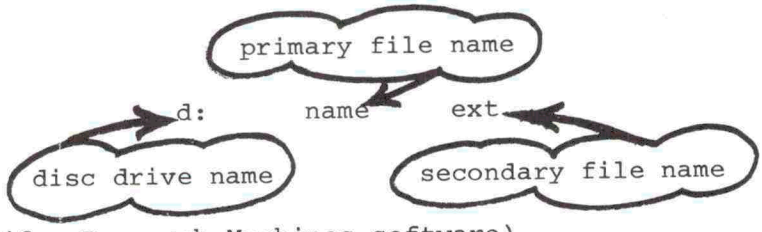
The CP/M command interpreter provides a mechanism for specifying groups of files by means of file name matches which are defined as follows:

.	denotes all files on a disc drive (see Chapter 4)
*.ext	denotes all files on a disc drive with the same secondary file name
name.*	denotes all files on a disc drive with the same primary file name

where the components in the file name must be created in accordance with the rules given on the page opposite.

NOTES

1. The display produced by the DIR command gives the complete file name in the form



where (for Research Machines software)

d - is one of the letters A, B, C, or D

name - is any sequence of up to eight alphanumeric characters and/or $ symbols

ext - is any three alphanumeric characters and/or $ symbols (but certain files must have particular extensions, for example files containing BASIC programs should have the extension BAS if they are to be processed by a BASIC interpreter).

Since the CP/M command interpreter treats any small letter as if it were the corresponding capital letter, file names for use with Research Machines software can only contain CAPITAL LETTERS, digits and the symbol $. CP/M commands on the other hand will also accept file names containing, in addition, any other symbols except * ? = : . ; < >.

2. If you type the DIR command without a space before the argument then the standard CP/M error message will be produced (see Chapter 4) - retype the command correctly.

3. If you type any character other than A, B, C, or D in the place of the drive name then an error message like

BDOS ERR ON E: SELECT

will appear. To recover, **press any key** and retype the command correctly.

 Copyright January 1982

CHECKING A DIRECTORY (DIR)

You can use the DIR command to check for the presence (or absence) of a FILE or a GROUP OF FILES. To check for an individual file

- **type DIR file name RETURN**

and to check for a group of files

- **type DIR file name match RETURN**

For example, if you

- **type DIR B:*.COM RETURN**

CP/M will list the names of all the files on the disc in drive B which have secondary file name COM.

It is sensible to get into the habit of checking disc directories before and after issuing CP/M commands to manipulate files.

DELETING A FILE (ERA)

Since the space available on a disc is limited it is sensible to discard any files of information which you no longer need. You can do this using the ERA (erase) command. To erase a file when the CP/M prompt is present

- **type ERA file name RETURN**

For example the command

```
A>ERA B:OLDATA.TXT RETURN
```

causes CP/M to search for a file named OLDATA.TXT on disc drive B. If it finds the file it deletes it, freeing the space which it occupied for use by other files. The sequence of commands

```
A>B: RETURN
B>ERA OLDATA.TXT RETURN
```

has the same effect except the system ends up with drive B as the current drive.

If you want to erase a group of files on a disc you type

- **type ERA file name match RETURN**

For example the command

```
A>ERA B:*.BAS RETURN
```

will delete all BASIC files (files with secondary file name BAS) on the disc in drive B.

Make sure you understand the rules for creating file names and file name matches before you use the erase command - you can check your understanding of these concepts by means of the DIR command.

NOTES

1. If you try to erase or rename a file on an empty drive or on a disc which is not properly inserted then a message like

   BDOS ERR ON B: BAD SECTOR

   will appear. To recover

   - type CTRL C

   to restart CP/M.

2. If you omit the space between the ERA (or REN) command and the argument then the standard CP/M error message will be produced - retype the command correctly.

3. If you try to erase a non-existent file or you give an illegal file name, ERA simply returns control to CP/M - no error message is produced. It is sensible to check the files currently on the disc using the DIR command both before and after using the ERA command.

4. You should take great care when you use a file name match as the argument of an ERA command as it causes the deletion of every file it matchs. When you

   - type ERA *.* RETURN

   the message

   ALL FILES (Y/N)?

   appears - so you have a chance to decide whether you want to delete all the files on the disc.

5. If you type in place of the drive name any character other than A, B, C, or D then an error message like

   BDOS ERR ON E: SELECT

   will appear. To recover, **press any key** and type the correct command.

6. If you attempt to erase or rename any file on a disc which CP/M has designated read only then an error message like

   BDOS ERR ON A: R/O

   will appear. To recover,

   - type CTRL C

   to restart CP/M this also causes the disc to become R/W unless the write protect notch is covered.

7. The arguments of the REN command must be file names and not file name matches. If a file name match is used as an argument then the standard CP/M error message will appear.

   - Retype with the correct argument.

RENAMING A FILE (REN)

Occasionally you may want to change the name of a file. You can do this using the REN (rename a file) command. To change the name of a file

- **type REN new file name=old file name RETURN**

For example the command

```
A>REN NEWFILE.TEX=MYFILE.TEX RETURN
```

causes CP/M to look for a file named MYFILE.TEX on the disc in drive A. If it finds the file it renames it NEWFILE.TEX. Similarly, the command

```
A>REN NEWFILE.TEX=B:OLDFILE.TEX RETURN
```

looks for the file named OLDFILE.TEX on the disc in drive B and renames it NEWFILE.TEX.

INSPECTING A FILE (TYPE)

The contents of any file that is held as a sequence of characters can be quickly and conveniently examined using the TYPE command. To inspect a file whenever the CP/M prompt is present

- **type TYPE file name RETURN**

For example the command

```
A>TYPE BNEWS.PRN RETURN
```

causes CP/M to look for the file named BNEWS.PRN on the current drive and, if it finds it, display its contents. Similarly

```
A>TYPE B:INFO2.TXT RETURN
```

looks for a file named INFO2.TXT on the disc in drive B and displays its contents.

NOTES

1. If you try to display a file on an empty drive or on a disc which is not properly inserted then a message like

   BDOS ERR ON B: BAD SECTOR

   will appear. To recover,

   - type CTRL C

   to restart CP/M.

2. The argument of the TYPE command must be a file name and not a file name match. If a file name match is used as an argument then the standard CP/M message will appear.

   - Retype with the correct argument.

3. If you type any character other than A, B, C or D in the place of the drive name then an error message like

   BDOS ERR ON E: SELECT

   will appear. To recover, **press any key** then type the correct command.

4. If you omit the space before the argument or make a mistake in specifying the argument then the standard CP/M error message will be produced. It is sensible to check the files currently on the disc, using the DIR command, before using the TYPE command.

2. TRANSIENT COMMANDS

Whenever CP/M is loaded you can always execute the four CP/M built in commands (DIR, ERA, REN and TYPE) even if you have removed the system disc. There are a range of other CP/M commands, called transient commands, which can only be executed when the corresponding COMMAND FILE is present. A command file is a file which contains a machine language program and whose secondary file name is COM. If the CP/M prompt is present then to execute a transient command

- **type cname plist** RETURN

where arguments are replaced as follows

cname - primary file name of a command (.COM) file

plist - a list of parameters whose form depends on the command concerned.

This results in CP/M looking for a file called **cname.COM** on the current disc, loading the program in this file, passing the parameter list to the program and executing it. You have already met the following transient commands: STAT (Chapter 3), FORMAT, MOVCPM, and SYSGEN (see Chapter 5). This sub-section provides a more complete description of the STAT command.

DISPLAYING THE STATUS OF A DISC OR A FILE (STAT)

The simple use of STAT to examine the status of a disc was described in Chapter 3. If you

- **type STAT** RETURN

then the status of the current disc and any other disc which has been referenced since the last restart of CP/M will be displayed provided a file named STAT.COM is on the current disc. To examine the status of any other disc

- **type STAT d:** RETURN

where the argument d is to be replaced by the disc drive name (the file STAT.COM must be on the current disc, but it need not be on the disc in drive d), for example

A>STAT C: RETURN

displays the status of the disc in drive C (the reverse side of the disc in drive A) with a message like

BYTES REMAINING ON C: 37K

To display the status of an individual file,

- **type STAT file name** RETURN

NOTES

1. When typing a CP/M transient command there must be at least one space between the command file name and the argument list. If this convention is not observed then the standard CP/M error message will be produced.

2. The effect of failing to type the argument correctly will depend on the transient command itself.

3. If you make a mistake in typing the argument of the STAT command then the following message will result

   FILE NOT FOUND

   which means either the file is not present or you have not punctuated the argument correctly (for example you have typed STAT B*.* instead of STAT B:*.*) - type the correct argument.

4. STAT reports the status of the discs as they are currently known to CP/M. If you replace a disc without restarting CP/M then the report provided by STAT will refer to the disc which was previously loaded rather than the one which is currently loaded.

 Copyright January 1982

and to display the status of a group of files

- **type STAT file name match RETURN**

For example the command

A>STAT B:*.TEX **RETURN**

will display the status of all text files (i.e. files with secondary file name TEX) on the disc currently in drive B. The interpretation of the output produced when STAT is used to display the status of individual files is explained in the notes opposite.

The STAT command provides an alternative method, other than using the write protect notch, of protecting the files on a disc which is currently loaded. If you

- **type STAT d: = R/O RETURN**

where d is a drive name. This causes CP/M to designate disc d as READ ONLY. A disc which has been designated read only in this way retains this status until CP/M is restarted at which time all the discs currently inserted are given read/write status unless physically write protected.

 Copyright January 1982

NOTES

1. The simple use of STAT displays the status of the disc and the space remaining (see Chapter 3). If you specify a file name or a file name match as an argument for STAT then the display will take a form like

```
RECS  BYTS  EXT D:FILENAME.TYP
  8    1K    1  B:MYFILE1.TEX
  4    1K    1  B:DRIVE.BAS
 16    2K    1  B:QUESTION.COM
BYTES REMAINING ON B: 68K
```

   The RECS column shows how many 128-byte sectors are currently allocated to the file, BYTS column how many kilobytes are allocated to the file, EXT column how many 16K elements (called extents) are allocated to the file and the right most column specifies the file name. CP/M always allocates sectors in multiples of 8. One file allocation record can only address up to 128 sectors (16K). For larger files the system automatically creates additional file allocation records - the entry in the EXT column shows how many extents and hence file allocation records, there are.

2. If you attempt to find the status of or to protect a non-existent disc then a CP/M error like

```
BDOS ERR ON E: SELECT
```

   will appear. To recover,

   - type CTRL C

   to restart CP/M.

3. If you attempt to find the status of or to protect a disc drive which is empty or in which the disc is not properly inserted, a message like

```
BDOS ERR ON B: BAD SECTOR
```

   will be produced.

   - Type CTRL C

   to restart CP/M.

3. COPYING FILES

The operations described in this section can only be carried out on systems with two disc drives. If your system has only one disc drive please refer to Appendix B.

COPYING A FILE

If you want to make a backup copy of a single file, called say MYPROG.BAS, then you use the utility program PIP in the following manner:

- **turn on the system, insert a system disc in DRIVE A and the disc onto which the file is to be copied in DRIVE B**

make sure this disc contains enough space to hold the new copy

- **load CP/M**

the normal CP/M prompt will appear

- **type PIP RETURN**

program PIP will be loaded and the PIP prompt, a "*" symbol, will appear

- **replace the system disc by the disc from which the file is to be copied**

- **type B:=A:MYPROG.BAS RETURN**

PIP creates a copy of the file MYPROG.BAS (with the same name) on the disc in DRIVE B, and and the copying process terminates with the PIP prompt. If a file named MYPROG.BAS already exists on the disc in drive B then it will be deleted when the new copy has been made.

If you want to make backup copies of other files on the disc in drive A then **repeat the last step**, substituting the appropriate file name in place of MYPROG.BAS, otherwise

- **replace the system disc in DRIVE A** and

- **type RETURN**

This returns control to CP/M.

If you want to CHANGE THE NAME OF THE FILE which you are copying, say from MYPROG.BAS to NEWP.BAS then carry out the first three steps listed above then

- **type B:NEWP.BAS=A:MYPROG.BAS RETURN**

and continue as before.

If you want to copy TWO (or more) SEPARATE FILES on the disc in drive A, named say PART1.TEX and PART2.TEX, and put the result into a new file, named say TOTAL.TEX, then carry out the first three steps listed above,

 Copyright January 1982

NOTES

1. Before undertaking any file copying operations use the STAT command (see Section 2) on both the discs involved to ensure the files you want to copy are present, to find out the lengths of files to be copied and to ensure there is enough space for these files on the disc which is to receive them.

2. If the disc from which the copies are to be made is either not inserted in the drive, or is not inserted properly, then when PIP is run the message

   BDOS ERR ON A: BAD SECTOR

   will appear. Insert the system disc

   - type CTRL C

   to restart CP/M and start the copying operations again from the beginning.

3. If program PIP is not present on the system disc then the response to

   - type PIP RETURN

   will be the standard CP/M error message.

4. The PIP argument message must be typed carefully because failure to specify the correct argument may lead either to the wrong file being copied or to one of the following error messages;

   a) BDOS ERR ON A: R/O

   This probably means you have either omitted the colon after the first drive name or you have changed the disc in one of the drives without reloading CP/M (see note 4 on Page 5.3). In any case insert the system disc

   - type CTRL C

   to restart CP/M and start the whole sequence all over again.

   b) NO FILE :

   followed by some sequence of characters. This means you have either requested a file which is not present (see note 1) or you have specified the file name incorrectly, for example AMYPROG.BAS instead of A:MYPROG.BAS. **Retype the correct argument.**

   c) INVALID FORMAT :

   followed by some sequence of characters means you have omitted part of the argument, for example you typed =A:MYPROG.BAS instead of B:=A:MYPROG.BAS. **Retype the correct argument.**

5. If both CP/M and PIP are on the disc from which files are to be copied or the disc to which files are to be copied then this disc can also be used as the system disc and the third step in the process described can be omitted.

- type **B:TOTAL.TEX=A:PART1.TEX,PART2.TEX** [RETURN]

and continue as before.

When the operation is complete the file TOTAL.TEX will contain the contents of the file PART1.TEX followed immediately by (concatenated with) the contents of the file PART2.TEX. Be careful when using this command that the disc in drive B has enough space left to hold the result of the operation.

The rules governing the creation of CP/M file names are specified in Section 1.

 Copyright January 1982

6. Similar file copying operations can be carried out either from disc drive A onto disc drive D or from disc drive C onto either disc drive B or disc drive D, by specifying the appropriate disc drive name in the PIP argument. You can also use PIP to copy files from one side of a disc to another, for example from disc drive A to disc drive C.

 Copyright January 1982

COPYING A GROUP OF FILES

If you want to make a backup copy of a group of files of the same type, for example all the command programs on a disc, then you use the utility program PIP in the following manner:

- **turn on the system, insert a system disc in DRIVE A and the disc on which the files are to be copied in DRIVE B** (making sure this disc contains enough space to hold the new copies) **and load CP/M** the normal CP/M prompt will appear

- **type PIP RETURN**

  the program PIP will be loaded and the PIP prompt, a "*" symbol, will appear

- **replace the system disc by the disc containing the files which are to be copied**

- **type B:=A:*.COM RETURN**

  PIP creates a copy on the disc in DRIVE B of all files with file type extension COM on the disc in DRIVE A (without changing their names) and the copying operation terminates with the PIP prompt.

To copy another group of files from the disc in DRIVE A **repeat the last step using the appropriate file name match** otherwise

- **replace the system disc in DRIVE A and**

- **type CTRL C**

  to return control to CP/M

This section has not described all of the copying operations that can be carried out using the program PIP, but those which have been covered should allow you to manage your file store effectively. If you require further information on PIP you should refer to "An Introduction to CP/M Features and Facilities - Digital Research Inc."

NOTES

1. Before undertaking the copying of a group of files use the STAT command (see Section 5) on both the discs involved to find out what files there are in the group which you intend to copy and the lengths of these files, and to check that there is enough space for them on the disc which is to receive them.

2. If the files being copied require more space than is available on the disc receiving them then PIP will copy as many files as it can and terminate with the message

   DISK WRITE ERROR:

   Any file which has not been completely copied will be given a file name extension "$$$". You should use the ERA command (Section 5) to delete this file as CP/M cannot access its contents.

3. If the disc from which the copies are to be made is either not inserted in the drive or is not inserted properly then when PIP is run the message

   O
   BDOS ERR ON A: BAD SECTOR

   will appear.

   - **Type CTRL C**

   to restart CP/M and start the copying sequence again from the beginning.

4. If program PIP is NOT present on the system disc then the response to

   - **type PIP** [RETURN]

   will be the standard CP/M error message.

5. The PIP argument message must be typed carefully because failure to specify the correct argument may lead either to the wrong files being copied or to an error condition - one of those described in Note 4 on Page 6.15.

6. Similar file copying operations can be carried out either from disc drive A onto disc drive D or from disc drive C onto either disc drive B or disc drive D, by specifying the appropriate disc drive name in the PIP argument. You can also use PIP to copy files from one side of a disc to the other, for example from disc drive A to disc drive C.

7. By means of a "standard file name", CON:, you can also use the PIP program to display the contents of files. For example if in response to the PIP prompt you

   - **type CON:=A:MYFILE.TEX** [RETURN]

   then if the file MYFILE.TEX is present on drive A, PIP displays the contents. Output of the file to the display is controlled in the same way as for any CP/M command (see Page 4.9).

 Copyright January 1982

CREATING A SYSTEM DISC

It is sensible to ensure that your working discs can act as SYSTEM DISCS by making sure that they contain at least the following files

CP/M		Copied onto disc with MOVCPM and SYSGEN
STAT	COM	occupies 3K bytes
PIP	COM	occupies 7K bytes
FORMAT	COM	occupies 2K bytes (can be omitted)
MOVCPM	COM	occupies 9K bytes (can be omitted)
SYSGEN	COM	occupies 1K bytes (can be omitted)

The procedure for creating a new system disc is as follows (if your system has only one disc drive please refer to Appendix B).

1. Format the new disc (Chapter 5, Section 2)

2. Copy CP/M onto the new disc (Chapter 5, Section 3).

3. Copy the command files specified above and any others you need onto the new disc (Chapter 6, Section 3).

4. Label the disc clearly showing

   - that CP/M is on the disc

   - which command files are on the disc.

 Copyright January 1982

8. When using PIP to copy files it is possible to instruct the system to VERIFY that the copied files are IDENTICAL to the original files. This feature is invoked by typing [V] at the end of the PIP arguments. For example if you

- type **B:=A:*.*[V]** **RETURN**

then all the files on disc A will be copied and verified onto disc B. Using this PIP option considerably lengthens the time required for the copying operation.

 Copyright January 1982

THIS PAGE INTENTIONALLY LEFT BLANK.

 Copyright January 1982

GLOSSARY OF TERMS

Applications software
Programs designed to carry out a particular task or set of tasks specific to a particular user.

Argument
A term used to describe a part of a command which can vary and which affects the action of the command.

ASCII
American Standard Code for Information Interchange; the form in which characters are encoded within the 380Z.

Assembler
A program, usually provided by the computer manufacturer, to translate an assembly language program into machine code. An assembler is an item of systems software, and as such is specific to a particular model of computer.

Assembly language
A low-level programming language which is translated into machine code by an assembler. A computer's assembly language is closely related to it's machine code (each instruction is translated into one machine code instruction). Its advantage over machine code is that it is easier to use. Its main advantages over high-level languages are that its programs can occupy much less memory, run much faster, and control more closely the activities of the computer. However, assembly programs take longer to write and require of the programmer a more intimate knowledge of the computer and programming techniques.

BASIC
Beginners All-purpose Symbolic Instruction Code - a high-level programming language commonly available on microcomputers. Its advantages are that it is easier to learn its vocabulary and grammar than with most other languages.

Baud rate
The rate, expressed in bits per second, at which data is transmitted through a serial interface.

Bit
Binary Digit - one of the digits used in binary notation (i.e. either 0 or 1).

Booting (Bootstrap)
A term used to refer to the process of loading the Disc Operating System into memory. The first part of the program is loaded into store and then it loads the remainder of the program. The process has been compared to pulling oneself up by ones bootstraps.

Break
To halt execution of a program with a keystroke or an instruction in the program.

 Copyright January 1982

Buffer

A part of computer memory set aside for temporary storage of data; it may readily be filled or emptied without disturbing the contents of the rest of the memory.

Bug

An error in a program.

Bus, Bus Cable

Means of carrying signals from one printed circuit board to another.

Byte

A set of 8 bits, often corresponding to a single character (i.e. one byte can be used to represent one character). Microcomputer memory sizes and file sizes are usually defined in terms of bytes.

Cassette-based (Configuration or microcomputer)

A microcomputer configuration that uses cassette recorders and tapes to save and load programs or data.

Cassette operating system (COS)

The basic control program (monitor program) for the 380Z microcomputer.

Central processing unit (CPU)

The "nerve centre" of the computer, consisting of the Arithmetic Unit, Control Unit and Memory (also called the Central Processor). In a Microcomputer, the CPU is often on one single printed circuit board.

Character set

A character could be any one of the letters of the alphabet, (upper or lower case), numeric digits, or other associated symbols (e.g.* or ?). A character set is the set of characters that a device is capable of handling. In the context of this manual the character set is the ASCII set. There are small differences between the character set used by the 380Z and between various printers but the main alphanumerics are the same.

Command

A sequence of characters entered from the keyboard and executed by COS or CP/M or a CP/M utility program. Each command consists of the name of the command followed by a list of arguments.

Compatibility

Two computers are compatible if programs can be transferred between them and used without alteration.

Compiler

A program which translates a high-level language program into a computer's machine code before the program is executed. (Each high level language instruction usually generates several machine code instructions).

Concatenate

The joining of two or more files into a single file having one file name. It can be carried out in CP/M with the PIP command.

Configuration
A term used to describe the central processor and the devices linked to it.

Control Character
A character typed while the CTRL key is depressed. The name originates from devices such as the teletypewriter which uses these characters to perform control functions such as turning on and off the paper tape reader. These characters are used to perform control operations (e.g. turning a printer on and off) or to issue commands (e.g. restart CP/M).

CP/M Operating System
Abbreviation for "Control Program for Microcomputers"- an implementation of the Digital Research Operating System used as the 380Z Disc Operating System. This operating system is an "industry standard" which means therefore that a wide variety of systems software and applications programs is available for the microcomputers which use it.

Data
Information in a form acceptable for input to, storage in processing by, and output from a microcomputer.

Data File
An organized collection of data in the form of a set of related records held on magnetic tape or disc.

Default
The value of an argument or part of an argument that is assumed by the system when no argument value is supplied by the user.

Directory
A special area of a disc that contains a list of the names of the files stored on that disc together with information about where to find them. The list of file names can be printed by the DIR command.

Disc drive
A device enabling coded information to be stored on (and retrieved from) a magnetic disc. The disc revolves at high speed and information is transmitted to and from it through "read/write heads". Because of the high speed of revolution information on any part of the disc can be located very quickly.

Disc Operating System (see CP/M)
The set of programs available to control a disc based microcomputer system.

Documentation
1) A complete description of a program usually including helpful notes, flowcharts, program listing, test data and sample output.

2) A complete description of a computer and its system software, usually in the form of manuals.

Editor (Text Editor)
A program which allows the user to edit a file. In some

 Copyright January 1982

microcomputers, editing facilities are built into the operating system and are automatically available through simple commands. Editing facilities are very valuable, since they obviate the need to retype complete files when only minor modifications are required. The standard 380Z Text Editor is a program called TXED.

Enhance

To improve or "upgrade" a computer configuration by the addition of an extra facility or item of equipment.

Error Message

Response on screen to a faulty command or an error detected by the operating system.

Execute

To obey a program by carrying out its commands. (Synonymous with "RUN").

File

A file is the form in which either data or a program is stored and moved from disc to computer and back. A file is created by assigning a file name.

File name

The first part of a file name acceptable to CP/M is called the primary file name. It consists of 1 to 8 characters drawn from the sets A to Z, 0 to 9 and $ (dollar sign). The second part of a file name is called the secondary file name and it consists of 1 to 3 characters from the same set separated from the preceding primary file name by a full stop (sometimes also referred to as the secondary file name extension of file type).

File name match

Used in CP/M to describe an abbreviation for a group of file names in which one or more characters are used to specify a class of files.

Floppy Disc

A non-rigid, lightweight magnetic disc which rotates like a small record inside a square plastic envelope. Available in two sizes:-

Standard floppy disc - about 8 inches in diameter which can store about 250K bytes of data (about 7000 BASIC program lines).

Mini-floppy disc - about 5 inches in diameter which can store about 70K bytes of data (about 2000 lines of BASIC program).

Front Panel

Method by which the contents of the 380Z's memory can be examined and modified and programs executed one instruction at a time.

Graphics

The ability of a computer to draw diagrams and produce images as opposed to merely printing text.

Graphics Board

A circuit board inside the microcomputer that enables graphics to be used.

Hardware
The items of equipment making up a computer configuration.

High-Level Language
A language designed for a specific purpose (e.g. BASIC, FORTRAN and COBOL) which is much closer to English and therefore easier to use than machine code or assembly language.

High-resolution graphics
Graphics capable of displaying reasonably fine lines (i.e. 250 horizontal picture points or more).

Interface
The necessary hardware and/or software to form a working connection between two systems or parts of a system (for example the central processor and a printer).

Interpreter
A program which translates and executes another program (written in a high-level language) one instruction at a time.

Kilobyte (K)
Consists of 1024 Bytes - used to indicate the size of the memory of a microcomputer; eg. 8K of memory is 8192 memory locations (bytes) or the amount of storage space on a disc. When used in conjunction with systems software (e.g. 8K BASIC interpreter) it indicates how much memory will be occupied by systems software if used.

Listing
Display of contents of a file on the screen or a printer.

Logged In Disc
A disc unit is logged into CP/M by typing a command line consisting only of its name. For example, the command "B:" logs into disc B. The name of the logged in disc is used as a prompt in CP/M. A file specification which does not contain a device name is assumed to refer to a file on the logged in disc unit.

Monitor
A monitor television screen used to display output from a microcomputer.

Null
NULL is ASCII code 0. In common with several other terms associated with printers and paper tape punches ASCII code numbers bear the names of their original functions. NULL is a "do nothing" command usually given to provide a time delay for a process to be completed.

Operating System (see COS and CP/M)
A control program which provides an overall means of communication between the user and the computer.

Patch
A group of instructions inserted to provide an extra facility or to correct an error in a program.

 Copyright January 1982

PIP

The CP/M Peripheral Interchange Program, used mainly for copying files from disc to disc and for listing them on the printer.

Ports

Memory addresses in which the data from external devices is placed on arrival and from which data is output.

Printer

A machine which produces printed output (print-out) from the computer.

Program

A complete set of programming language statements to perform a specified task.

Programming language

A code (with a limited vocabulary of key words and well-defined syntax rules) which allows the user to communicate with a computer and to instruct it to perform tasks.

Prompt

Indication on the screen that the computer is ready for you to type a command.

Random Access Memory (RAM)

Memory of a computer which is capable of holding the user's program and data. The contents of this kind of memory are lost when the computer is switched off.

Reading

The process of transferring data from a file to computer.

Read Only Memory (ROM)

A memory whose content is fixed (i.e. not lost when the machine is switched off). The monitor program (see COS) is usually held in ROM so that it is available as soon as the computer is switched on. The contents of ROM cannot be altered by program instructions.

Restart Address

The memory address to which execution can be transferred to restart a program without losing the data on which the program is operating.

Save

The transfer of a program from immediate memory to a backing store medium (e.g. floppy disc or cassette).

Scroll

To produce a display of lines of characters on a screen which move upwards with new lines coming from below.

Sector

One sixteenth of a track on a mini-floppy disc.

Software

A term used to refer to programs in general.

Statement
In programming, statement is synonymous with "instruction".

Text Editor
A piece of software used to edit text stored in a computer. The text sometimes represents a computer program or it may be an article or a letter.

Track
The mini-floppy discs used with the 380Z store data on 40 concentric rings or tracks on each side.

User Memory
The immediate memory available to the user, that is, the random access memory in the microcomputer which is not used by the operating system or other essential items of systems software.

Visual Display Unit (VDU)
A display device, incorporating a cathode ray tube (as used in a television receiver), on which information is displayed. It often also incorporates a keyboard through which information can be sent to the computer.

Word Processor
A microprocessor, keyboard, printer and software sold as a package to aid the preparation of text. It is capable of storing the drafts of letters and articles so that later they can be edited and a fair copy can be produced without a complete retype.

Wrap-around
The name of the process in which a display or a printer handles long lines by filling one line and putting the excess on the next line.

Writing
The process of transferring data from the computer to a file.

 Copyright January 1982

MDS-1 UTILITIES

If your system has only one disc drive then you will have to use the procedures described below for copying discs and files rather than those given in Chapters 5 and 6.

1. COPYING CP/M

It is good practice to have a copy of the CP/M program on each of the discs you are using because this enables you to start or restart your system using any of your discs. Two utility programs MOVCPM and SYSGEN are used to put a copy of CP/M onto a disc. To put the CP/M programs onto a disc proceed as follows:

- **turn on the system, insert a system disc in the DRIVE and load CP/M**

  the normal CP/M prompt will appear

- **type MOVCPM * * RETURN**

  MOVCPM will be run and the message

  ```
  CONSTRUCTING 56K CP/M VERS 1.4
  READY FOR "SYSGEN" OR
  "SAVE 32 CPM56.COM"
  A>
  ```

  or one similar to it will appear

- **type SYSGEN RETURN**

  the message

  ```
  SYSGEN VER 1.4
  SOURCE DRIVE (OR RETURN TO SKIP)
  ```

  will appear

- **type RETURN**

  the message

  ```
  DESTINATION DRIVE (RETURN TO REBOOT)
  ```

  will appear

- **replace the system disc by the disc onto which CP/M is to be copied**

- **type A**

  the message

  ```
  DESTINATION ON A, THEN TYPE RETURN
  ```

  will appear, make sure the CORRECT destination drive is specified

- **type RETURN**

  the message

  ```
  FUNCTION COMPLETE
  DESTINATION DRIVE (RETURN TO REBOOT)
  ```

  will appear

- **REMOVE the disc from the DRIVE** and

 Copyright January 1982

EITHER

- **insert another disc into DRIVE A and repeat the previous 4 steps to copy CP/M onto this disc**

or

- **insert a system disc in the drive**
- **type RETURN**

which terminates execution of SYSGEN and returns control to CP/M.

****

NOTES

1. Before using this procedure read through the notes on the use of MOVCPM and SYSGEN given on page 5.6, because you will need to refer to these notes if you have any difficulties when using these utility programs.

2. The CP/M program is not a file and so it is not listed by the DIR command. If you are not sure whether CP/M has been copied onto a disc the only way to check is to

   - **press RESET**
     the normal COS prompt will appear
   - **put the disc you want to check into the DRIVE**
   - **type B**

   and if the CP/M start up message and prompt appear then CP/M is present on the disc.

3. If the program CP/M is present on a disc then the CPYDSK utility described below copies it as well as all the files on the disc.

****

2. COPYING A COMPLETE DISC

To copy a complete side of a disc:

- **turn on the system, insert a system disc in the drive and load CP/M**

the normal CP/M prompt will appear

- **type CPYDSK RETURN**

the CPYDSK program is loaded and the message

SOURCE DISK (A/C):

will appear. If the side to be copied from is A,

- **type A RETURN**

CPYDSK then prompts

DESTINATION DISK (A/C):

If the copy is to go to side A

- **type A** [RETURN]

Then CPYDSK prompts

INSERT MASTER DISK, TYPE RETURN:

- **replace the system disc by the disc which is to be copied**
- **type** [RETURN]

the CPYDSK program will be executed and the message

INSERT NEW DISK, TYPE RETURN:

will appear

- **replace the disc which you are copying by the disc onto which you are making the copy**
- **type** [RETURN]

the CPYDSK program will be executed and if the side you are copying is quite full, the message

INSERT MASTER DISK, TYPE RETURN:

will reappear, repeat the last four steps until the message

COPY COMPLETE

followed by the COS prompt appears

- **insert a system disc in the drive and load CP/M**

****

NOTES

1. Before copying a disc check that it contains the files you want to copy by using the DIR command. The program CPYDSK copies the complete disc, including the CP/M program if it is present. Selective copying of files from one disc to another is explained below.

2. If either of the discs involved in the copying process is not inserted properly in the drive then the message

   BDOS ERR ON A:BAD SECTOR

   will appear. Put back the system disc

   - **type CTRL C**

   to reload CP/M and start the copying operation again.

****

 Copyright January 1982

3. COPYING A FILE

To copy an individual file, called say MYPROG.BAS

- **turn on the system, insert a system disc in the drive and load CP/M**

the normal CP/M prompt will appear

- **type CPYFIL RETURN**

the CPYFIL program is loaded and a message like

```
SINGLE DISK FILE COPY V 3.0
Copyright (c) 1979 by Research Machines
```

will appear, followed by the CPYFIL prompt, a "*" symbol.

- **type MYPROG.BAS RETURN**

the program CPYFIL is executed and the message

```
Insert master disk, type RETURN:
```

will appear

- **replace system disc by disc containing file to be copied**
- **type RETURN**

the program CPYFIL is executed and the message

```
Insert new disk, type RETURN:
```

will appear

- **replace the disc you are copying the file from by the disc onto which the file is to be copied**

- **type RETURN**

if the file is a large one then the message

```
Insert master disk, type RETURN:
```

will reappear, repeat the last four steps until the message

```
Copy complete
```

appears followed by the CPYFIL prompt, then either

- **type file name RETURN**
  to copy another file

or

- **type CTRL C**
  to reload CP/M.

****

NOTES

1. If the file you are copying already exists on the disc you are copying it to then the message

   File exists-replace (Y/N)

   will appear. If you want to replace the existing file with the file you are copying,

   - type Y

   otherwise
   - type N

2. If you type anything other than a valid file name in reply to the CPYFIL prompt then the message

   Invalid file specification
   Please supply a file name
   in the form FILE.EXT

   will appear followed by the CPYFIL prompt. The rules governing the creation of file names are given on page 6.5.

3. If the file name you specify is not present in the directory of the disc from which you are attempting to copy the file then the message

   File not found

   will appear followed by the CPYFIL prompt.

4. The program will only copy from side A of one disc to Side A of the other, or from side C of one disc to side C of the other. The source drive is the currently logged drive or the drive specified with the filename, e.g. C:MYPROG.BAS

5. CPYFIL versions before 4.1A can only copy files to and from discs in drive A. If you want to copy a file which is on drive C then you must use program PIP to copy the file from drive C to drive A (see pages 6.14-6.15) and then use program CPYFIL. If you want to copy a file onto drive C then you must use CPYFIL to copy the file to drive A and then use program PIP to copy the file from drive A to drive C.

6. A SYSTEM DISC for a single disc system should include, in addition to the programs specified on page 6.20, the programs CPYDSK and CPYFIL - these will require an extra 3K bytes of storage space.

****

EARLIER VERSIONS OF THE MINI DISC SYSTEM

Versions of the Mini Disc System sold before 1st April 1981 differ in a number of details from the system described in this manual. The principal differences and some of their consequences are described below.

1. DISC DRIVES

Versions of the Mini Disc System sold before 1st April 1981 have their disc drives mounted VERTICALLY. On these systems the drives are labelled as follows:

LEFT (or only) DRIVE, LEFT SURFACE - DRIVE A
RIGHT SURFACE - DRIVE C

RIGHT DRIVE, LEFT SURFACE - DRIVE B
RIGHT SURFACE - DRIVE D

To open the doors on these drives apply pressure to the centre of the right-hand side of the drive and the door will spring open.

To insert discs in these drives hold the disc in your right hand with you thumb on the label and the write protect notch on the bottom edge of the disc.

The very earliest versions of the Mini Disc System, sold before 1st May 1980, were fitted with SINGLE-SIDED disc drives (mounted vertically). On these systems the drives are labelled as follows:

LEFT (or only) DRIVE - DRIVE A
RIGHT DRIVE - DRIVE B

These systems can be distinguished by the COS message which is displayed when the system is turned on. If the VERSION NUMBER in the message is 3.0 or 2.3 then the system uses single-sided discs.

Some of the utility programs (for example FORMAT) provided with these systems will not work properly on later Mini Disc Systems which are equipped with double-sided discs.

2. KEYBOARD

Versions of the Mini Disc System sold before 1st September 1980 were equipped with a slightly different keyboard. The differences were

- two extra control keys, located on the top and bottom right-hand corners of the keyboard (where the dummy keys on the present keyboard are located) and labelled US/SI and FS/FF

- the underline (_) and the DELT keys were combined on the same key, located in the same position as the underline key on the existing keyboard and labelled DELT/_

- an extra control key located in the same position as the present DELT key and labelled BREAK

The extra control keys perform no useful functions when the system is operating under either COS or CP/M.

 Copyright January 1982

Deletion is achieved by pressing DELT and SHIFT; pressing DELT alone displays a # symbol not the underline symbol.

On some of these earlier keyboards the ESC key was labelled ALT MODE. With SOME of these keyboards pressing this key does NOT TRANSMIT THE SAME CODE as pressing the ESC key on the present keyboard - this difference is important if you intend to use the Text Editor (for further information please refer to the Research Machines TXED REFERENCE MANUAL - Appendix D).

3. INTERFACES

Many different interface options have been provided on past and present versions of the Mini Disc System. Information on how to distinguish the various interface options is provided in the 380Z Disc System Information File.

 Copyright January 1982

SOFTWARE AVAILABLE

Disc Operating System (CP/M)

The following items of software are provided on the "CP/M Disk Operating System" software issue disc.

File name	Documentation	Purpose
-	User Guide (1)	CP/M program to control the operation of the Mini Disc System.
FORMAT.COM	User Guide	Format a new disc
MOVCPM.COM	User Guide	Create a version of CP/M to match a given memory size
SYSGEN.COM	User Guide	Copy CP/M onto a disc
PIP.COM	User Guide (2)	Copy disc files
STAT.COM	User Guide	Display status of a disc or a file
CPYDSK.COM	User Guide	Copy a complete disc (single disc system)
CPYFIL.COM	User Guide	Copy a file (single disc system)
HELP.COM	User Guide	Summary of some basic CP/M operations
CONFIG.COM	Information File	Configure a version of CP/M to meet given requirements
TSTSYS.COM	Information File	Test memory operations
LOAD.COM	Information File	Load a file in INTEL HEX machine code and produce a command file
DUMP.COM	Information File	Display the contents of a file in hexadecimal form
DDT.COM	Information File	Dynamic debug a program
SUBMIT.COM	CP/M Manual (3)	Submit a file of commands for Batch Processing
VERIFY.COM	Information File	Check the read/write status of a complete disc
MDOC	Information File	Check the read/write status of individual sections of a disc and/or patch a disc
S1INP.HEX S2INPA.HEX S4INP.HEX	Information File	Input peripheral drivers to be patched into PIP.

 Copyright January 1982

NOTES

1. Additional information on CP/M and the standard CP/M utilities (MOVCPM, SYSGEN, PIP, LOAD, DUMP, DDT, SUBMIT) can be found in "Introduction to CP/M Features and Facilities" published by Digital Research.

2. The use of PIP with input and output devices (paper tape readers, printers, etc.) is covered in the 380Z Disc System Information File.

3. For information on these programs please refer to the manual referred to in note 1.

Applications Software

The following major items of applications software are examples of those available from Research Machines Ltd. When ordering software for use with your system please specify that it is for a **Mini Disc System** and give the **basic monitor version number (e.g. COS 4.0).** Before using an item of applications software make sure you are familiar with the basic operations of the Mini Disc System as explained in the User Guide.

RML Extended BASIC Interpreter

Fast, general purpose BASIC interpreter with 7 digit floating point arithmetic, string handling functions, graphics output, sequential file handling and line editing.

Documentation: RML EXTENDED BASIC VERSION 5 - REFERENCE MANUAL
If you are using RML BASIC with the **high resolution graphics option** then you will also need

RML HIGH RESOLUTION GRAPHICS - REFERENCE MANUAL.

If you are using the **high resolution colour graphics option** you will need in addition

RML.363-222 RGB Converter Board Operating Manual.

RML Interactive Text Editor and Formatter

A powerful character orientated text editor comparable to those available on main-frames. The system can operate in either immediate mode in which editing is carried out directly on the screen, or in command mode in which editing is carried out by the system working through a stored sequence of commands. The system can be provided with a formatter to generate and output formatted text to a printer.

If you plan to use the ZASM Assembler, Microsoft FORTRAN 80, RML ALGOL 60 or CIS COBOL then you **must use the TXED Text Editor to input and maintain your files of source programs.**

Documentation: RML TXED TEXT EDITOR AND FORMATTER

RML ZASM Z80 Assembler

An absolute assembler using Zilog mnemonics and producing object code in industry standard INTEL HEX format.

Documentation: RML ZASM-Z80 ASSEMBLER
You will also need a definition of the Zilog Assembly Language which research Machines can provide you with.
Z80 Programming Manual V2.0 published by MOSTEK.

Microsoft FORTRAN 80

A FORTRAN compiler for a dialect of FORTRAN close to standard FORTRAN 66 (ANSI document X 3.9-1966) which outputs pseudo code which can then be linked and loaded using the Microsoft L80 Linker which incorporate segments from a system library and segments output by the Microsoft M80 Macro Assembler. The system provides a comprehensive range of sequential and random file handling facilities.

Documentation: RML FORTRAN 80 Reference Manual.
If you are using RML FORTRAN with high resolution graphics you will also need
RML HIGH RESOLUTION GRAPHICS - REFERENCE MANUAL
and also RML.363-222 RGB CONVERTER BOARD OPERATING MANUAL
if you are using colour graphics.

CBASIC

A BASIC compiler that was designed to meet the needs of Data Processing systems development. The language provides many extensions to normal BASIC including: long variable names, 14 digit BDC arithmetic, string arrays and string processing functions, WHILE...WEND and IF...THEN...ELSE constructs, formatted printing (PRINT USING), sequential and random access file processing (with variable length records) and a source language library facility.

DOCUMENTATION: CBASIC A REFERENCE MANUAL-SOFTWARE SYSTEMS INC.

Research Machines ALGOL 60

An ALGOL 60 compiler designed specially for use on small computers. Almost all the features of ALGOL 60 are implemented together with a number of extensions, in particular type BYTE ARRAY, string handling functions and direct disc I/O.

DOCUMENTATION: RESEARCH MACHINES ALGOL 60-REFERENCE MANUAL

If you are using ALGOL 60 with high resolution graphics you will also need a copy of
RML HIGH RESOLUTION GRAPHICS-REFERENCE MANUAL
and also
RML.363-222 RGB CONVERTER BOARD OPERATING MANUAL
if you are using colour graphics.

 Copyright January 1982

CIS COBOL

A COBOL compiler designed specially for use on small computers. Two versions of the compiler are available: standard ANSI COBOL (ANSI X3.23 1974) with some extensions and "compact" COBOL. The system also provides, as an option, a powerful utility program called FORMS which allows the user to define screen layouts for use by COBOL programs and which automatically generates programs to maintain files with the "form data" in them.

DOCUMENTATION: CIS COBOL-LANGUAGE REFERENCE MANUAL VERSION 4, MICRO FOCUS INC. CIS COBOL-OPERATING GUIDE VERSION 4, MICRO FOCUS INC.
and if you are using the FORMS Utility Program
CIS COBOL FORMS UTILITY MANUAL, MICRO FOCUS INC.

For information on **the many other items of applications software** available from Research Machines please contact

THE SALES OFFICE,
Research Machines Ltd.,
PO BOX 75,
Oxford OX2 0BW.
Tel: 0865-49866

USE WITH TELEVISION

An interface can be fitted to a Varitext system to allow a 625-line UHF television set to be used in place of a monitor. Due to the narrow band width of television sets you are unlikely to obtain satisfactory results when the system is in 80-character mode.

Connecting Up

To connect a television to the central processor you need a cable with a TV coaxial plug at each end.

- **Push one end of the coaxial cable onto the appropriate socket at the rear of the processor marked T.V., adjacent to the monitor socket.**
- **Push the other end into the normal aerial socket of the television set.**

Tuning In

To tune the set, switch on the processor and the television, press the reset button and type W to enter 40-character mode. On the television, set the volume control to its minimum and adjust the tuning control until the COS output, e.g.

```
COS 4.0/M
→ W
→
```

is clearly visible.

There are several frequencies on which you can pick up signals from the 380Z. Frequencies close to the wavebands used by your local TV channels may not offer very good receptions. You should therefore determine by trial and error, over the whole tuning range of your TV set, which frequency offers the best reception and make a note of this frequency for future use.

 Copyright January 1982

INDEX

Address allocation map (see file allocation record)
Address range **1.5**
Adjusting controls on Monitor **3.10 - 3.11**
Appending to a file (see concatenating)
Applications software 1.4 - 1.5, **A.1,** D.2 - D.4
Argument 5.7, 5.9, 6.15 - 6.20,**A.1**
ASCII 1.3, 4.6 - 4.8, **A.1**

BASIC 1.5, **A.1,** D.2 - D.3
Baud rate **1.3,** A.1
B command 3.3, **3.6 - 3.7,** 5.8, B.2
BDOS ERR 3.5, **5.2 - 5.3**
Error codes **5.3**
ON E:SELECT **5.2,** 6.3, 6.5, 6.7, 6.9, 6.13
ON A/B:R/O **5.2,** 6.7, 6.15
ON A/B:BAD SECTOR **5.2,** 5.5, 5.9, 6.3, 6.9, 6.13, 6.15, B.3

Booting (see loading CP/M)
Bottom surface of disc **1.3**
BREAK **5.9,** A.1
Brightness and contrast controls **3.10**
Built-in commands **6.10**
BYTS **6.13**

Capitals mode **4.2 - 4.3**
CAPS LOCK key **4.2 - 4.5**
Carrage return (see RETURN)
Central Processor (CPU) **1.2 - 1.4,** 2.2 - 2.5, A.2
Changing the disc in a drive **5.3**
Changing the name of a file (see renaming a file)
Character set **4.6 - 4.9,**
Checking for CP/m **5.8,** B.2
COM **6.10**
Command files **6.10**
Command 1.4, **A.2**
Compiler 1.4, **A.2**
Computer system **1.2,** 1.4
CON: **6.19**
Concatenating files **6.14,** A.2
Connecting up **2.4 - 2.5**
Control characters **4.6 - 4.7,** A.3
Control codes **4.6 - 4.9**
Control keys **4.2 - 4.7,** C.1
Control of paging **4.8 - 4.9**
Copying CP/M **5.6 - 5.7,** B.1 - B.2
Copying a disc 5.2, **5.8 - 5.9,** B.2 - B.3
Copying a file **6.14 - 6.15,** B.3 - B.5
Copying a group of files **6.18 - 6.19**
COS **1.4 - 1.5,** 3.2 - 3.3, 3.7, 4.7, 5.8, 5.9, C.1, D.2
COS commands 1.4, **3.2 - 3.3,** 3.6 - 3.7, 5.8
COS prompt **3.2,** 3.6
COS use of memory **1.5**
CP/M **1.4 - 1.5,** 3.3 - 3.9, 4.2 - 4.3, A.3, B.2, D.1 - D.2
CP/M commands 1.4, **3.8 - 3.10,** 4.4 - 4.6, 6.2 - 6.9
CP/M Disc System Errors (see BDOS ERR)

CP/M Errors
Standard message **3.9,** 5.9, 6.15, 6.19
FILE NOT FOUND **6.11**
CP/M use of memory **1.5**
CPU board **1.3**
CPYDSK **B.2 - B.3,** D.1
Error: BDOS ERR **B.3**
CPYFIL **B.3 - B.5,** D.1
Error: Invalid file specification **B.4 - B.5**
File not found **B.5**
Creating a system disc **6.20,** B.5
CTRL key 0.2, **4.6**
CTRL A - COS command **4.8 - 4.9**
CTRL C - COS command **4.7**
CTRL C - CP/M command **4.7,** 5.4 - 5.5, 5.8 - 5.9, 6.3, 6.9, 6.13, 6.15 - 6.19
CTRL U - CP/M command **4.6 - 4.7**
CTRL Z - BASIC command **4.8**
Current drive **3.6, 6.2**
Cursor **3.8, 4.3, 4.4, 4.8**

Data 1.2, 1.4, **A.3**
Deleting a file (see Erasing a File)
Deleting a line **4.6 - 4.7**
DELT key **4.3 - 4.7,** C.1 - C.2
DIR command 3.8, 3.10 - 3.11, **6.2 - 6.3**
Directory **1.5,** 3.8 - 3.9, 6.2 - 6.3, A.3
Disc **1.2 - 1.3,** 1.5, 3.4 - 3.5, 3.7 - 3.12, 5.2 - 5.3, 6.13, A.4
Disc controller board **1.3**
Disc drive **1.2 - 1.3,** 3.4 - 3.7, 5.2 - 5.3, A.3, C.1
Disc drive labelling **1.3,** 3.4, 3.6, C.1
Disc drive name **1.3,** 3.9, 6.2, 6.4 - 6.5, C.1
Disc operating system (see CP/M)
Disc space 1.5, **3.10 - 3.11,** 6.13
Disc system errors (see BDOS ERR)
Display (see Visual Display),
Displaying a disc directory (see DIR command)
Displaying a file (see also TYPE command) **6.19**
Displaying the status of a disc or a file **6.10 - 6.13**
Distribution disc 3.7, 5.2, 5.8, **D.1 - D.2**
Double sided discs **1.3,** C.1
Drive specifier (see disc drive name)

Earthline interference **2.3**
Erasing a file (ERA command) **6.6 - 6.7**
Error messages (see CP/M errors, Disc system errors etc.)
ESC key 0.2, **4.3 - 4.5,** C.2
Examining disc directories (see DIR Command)
EXT **6.13**

File **1.4 - 1.5,** 3.8 - 3.9, 5.2, 5.8 - 5.9, Chapter 6, A.4, B.3
File allocation record **1.5,** 6.13
File extents **6.13**
File name **1.5,** 3.8 - 3.11, 6.4 - 6.5, 6.14, A.4
File name match 6.2, **6.4 - 6.5,** 6.18
File type extension 3.9, **6.5,** 6.18
Flashing cursor 3.8, **4.8**
Floppy discs (see disc)

FORMAT **5.4 - 5.5,** 6.10, C.1, D.1
Errors: Disk not ready **5.5**
Invalid disk try again **5.5**
Format complete, n errors **5.5**
Formatting a disc (see FORMAT)
Front Panel **5.9**

Graphics characters 1.3, **4.7**

Hardware **1.2 - 1.3,** A.5
HELP file **3.8 - 3.10,** D.1
High resolution graphics board 1.3, **D.2 - D.3**

Input message **1.2**
Inserting a disc **3.4 - 3.5**
Inspecting a file (see TYPE command)
Interpreter 1.4, **A.5**
I/O connector **1.3**

Keyboard 1.2 - 1.3, 2.2 - 2.5, **4.2 - 4.9**

LINE FEED key **4.3 - 4.5**
Loading CP/M 1.4, **3.4 - 3.7**
Logged in drive (see current drive)
Logging into a drive **6.2**
Lower case 3.11, **4.2 - 4.5,** 6.3

Machine language (machine code) **1.4**
Mains Leads **2.2 - 2.5,** 3.2, 3.10
Memory **1.2 - 1.5**
Memory requirement (see address range)
Memory mapped port **1.3**
Microprocessor **1.2 - 1.3,** 1.5
Mini Disc System (MDS) **1.2 - 1.3**
Mini-floppy disc (see disc)
Monitor (see Visual display)
Monitor program (see COS)
MOVCPM **5.6 - 5.7,** 6.10, B.1 - B.2, D.1 - D.2
Error:INVALID MEMORY SIZE **5.7**
MOVCPM arguments **5.7**

Normal mode **4.2 - 4.5**

Operating system (see COS and CP/M)
Output message **1.2**

Page mode 3.8, **4.8 - 4.9,** 5.5
Peripheral devices **1.4**
PIP 5.8 - 5.9, **6.14 - 6.19,** A.6, B.5, D.1 - D.2
Error: BDOS ERR 5.9, **6.15,** 6.19
?BOOT? **5.9**
BREAK **5.9**
DISK WRITE ERROR **6.19**
INVALID FORMAT 5.9, **6.15**
NO FILE **6.15**
PIP agruments 5.8 - 5.9, **6.14 - 6.18**
Primary file name 3.9, **6.5,** 6.10,
Printed Circuit Boards (PCB) **1.3**

Printer **1.2 - 1.3**
Processor key (lock) **3.2 - 3.3,** 3.10
Program **1.2,** 1.4, A.6
Protected disc (see Write protected disc)
Purchasing discs 3.5, **3.12**

R/O **6.12**
R/W **3.10**
RAM 1.3, 1.5, **A.6**
Read only disc (see Write protected disc)
Read/write head 1.2, **3.12**
RECS **6.13**
Reloading CP/M (see Restart CP/M)
Renaming a file (REN command) **6.8 - 6.9,** B.5
REPT key **4.3 - 4.5,** 4.7
Reset button **3.2 - 3.3,** 3.6 - 3.7, 4.7, 5.8, B.2
Resident monitor (see COS)
Restart COS **3.3,** 3.7, 4.7
Restart CP/M 3.7, **4.7,** 5.3, 5.5, 5.9, 6.3, 6.5, 6.9, 6.11, 6.13, 6.15, 6.19
RETURN key 0.2, 3.8 - 3.9, **4.3 - 4.6**
ROM 1.3, 1.5, **A.6**

Screen (see Visual display)
Scrolling **4.8 - 4.9,** A.7
Secondary file name 3.9, **6.5 - 6.6,** 6.12
Sector 3.7, **3.12,** 5.3, A.7
Serial interface **1.3**
Setting up **2.2 - 2.3**
SHIFT key **4.2 - 4.4**
Single disc system (MDS-1) 6.14, **B.1 - B.5**
Software 1.2, **1.4 - 1.5,** A.7
Software issue disc 5.2, 5.8, **D.1 - D.2**
SPACE BAR **4.3 - 4.4**
Standard Peripheral devices **1.4**
Starting up **3.2 - 3.3,** 3.6 - 3.7
STAT command 3.8, 3.10 - 3.11, 5.9, **6.10 - 6.13,** 6.19, 6.20, D.1
Store (see memory)
Switching off 3.4 - 3.5, **3.10 - 3.11**
Switching on **3.2 - 3.5**
SYSGEN 5.6 - 5.8, **6.10,** D.1 - D.2
System **1.4**
System disc **3.4 - 3.7,** 5.4 - 5.6, 5.8, 6.14 - 6.18, B.1, B.5
System restart (see Restart COS, Restart CP/M)
System software **1.4**

Teletext characters 1.3, **4.6 - 4.7**
Television **E.1**
Terminating output 3.8, **4.8 - 4.9,** 6.19
Text editor 1.5, 4.5, A.7, **C.2,** D.3
Top surface of disc **1.3,** 1.5, 3.4
Track 3.7, **3.12,** 5.3, A.7
Transient commands **3.11**
TYPE command 3.8 - 3.9, 6.2, **6.8 - 6.10**

Unpacking **2.2 - 2.3**
Upper case 3.11, **4.2 - 4.5,** 6.3
Using the keyboard **4.2 - 4.7**
Using the visual display **4.6 - 4.9**

 Copyright January 1982

Utility programs **1.4**

Varitext **1.2**
Verification **6.21**
Video Monitor (see Visual display)
Visual Display 1.2 - 1.3, **2.2 - 2.5,** 3.2 - 3.3, 3.10 - 3.11, 4.6 - 4.9, A.6 A.7
VDU Controller Board **1.3**

Write enable (permit) notch 3.5, **5.3**
Write protected disc **3.5,** 5.2 - 5.3, 6.12

X command 3.3, **3.6**

 Copyright January 1982